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SUMMARY OF RECENT ABSTRACTS *

VI. PLAGUE †

Epidemiology: Animal Reservoirs: Transmission

DULIEU (p. 648) has written a history of the many outbreaks of plague which took place in Montpellier, especially the outbreak of 1629–30, with a description of the thorough cleansing which was applied to the town when the epidemics ended.

MEYER (p. 31) sums up recent advances in the natural history of plague and psittacosis, describing the history of plague in California and stressing the interchange of fleas between wild rodents and domestic rats. He refers to the work on wild rodent plague in Kurdistan and in East Africa. He thinks that human plague consists of only 2 main types, bubonic and pulmonary, and he discusses transmission and chemotherapy.

KARTMAN *et al.* (pp. 763, 1108) show that in the western United States there were in 1908–51 91 recorded cases of plague, of which 57 were fatal; 1 other was recorded in 1956. The principal reservoirs are now thought by plague workers to be rodents other than ground squirrels and the large conspicuous species. MILES *et al.* (p. 36) near San Francisco studied the commingling of wild and commensal rodents and their fleas. The exchange of fleas between the smaller rodents and commensal rats suggested that the local field mice were probably important. Plague bacilli were isolated from 4 pools of fleas in one area, and trapping revealed a plague epizootic which reached a population of *Rattus norvegicus*.

In part of California where plague was epizootic MURRAY (p. 504) recovered *Pasteurella pestis* from pools of *Opisodasys keeni* and *Malaraeus telchinum*. He found that poisoning was ineffective in reducing transmission in wild rodents, but it was effective in controlling rats on hog farms. It seemed likely that suppression of domestic rodents would remove the risk of transmission of plague from wild rodents to man. HARTWELL *et al.* (p. 1007) report a study

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on plague in this series see the July issues of the *Tropical Diseases Bulletin* each year since 1939.

of the transfer of fleas from Californian voles to domestic rats, in which they tagged the fleas with radioactive cerium. They found direct proof of transfer from the field rodent to the domestic rat, a mechanism important in the epidemiology of human plague. BACON *et al.* (p. 763) failed to find *P. pestis* in field rodents examined in Washington State, but they showed that certain groups of wild mice are susceptible to the infection experimentally by inoculation.

MACCHIAVELLO (p. 33) describes an outbreak of plague in Peru, in which infection almost always occurred when the patients were working in the maize fields. There was clear evidence of epizootics in the field rodents, and the flea *Polygenis litargus* was found infected in nature, and the infection persisted in it for several months, which might explain the maintenance of the disease in inter-epizootic periods. The mammalian reservoir is believed to be *Sciurus stramineus nebouxi*. No species of *Rattus* were found, and no *Xenopsylla cheopis*; the outbreak was one of pure wild rodent plague.

An apparatus for the rapid collection of fleas from rodent nests is described by MILES and KINNEY (p. 503).

KARTMAN (p. 503) has evolved a Plague Vector Potential as a measure of the capacity of species of fleas to transmit the infection, and which is calculated on the basis of examination of species after feeding on infected animals, the proportion of caught fleas which cause infection when inoculated into a test animal, and the flea index of rodents or their nests. *Hystrichopsylla linsdalei* is thought to be the primary vector of plague to voles and field mice in the San Francisco Bay region; KARTMAN *et al.* (p. 1223) found its efficiency less than that of *X. cheopis*—fewer became blocked and those that were blocked did not live so long as *X. cheopis*. There seem to be specific physiological differences between the fleas in their capacity to allow bacterial multiplication in the gut.

STARK and KARTMAN (p. 37) have been able to cultivate *Xenopsylla vexabilis hawaiiensis* in large numbers as a preliminary to testing its efficiency as a vector of plague.

Aetiology

GIRARD (p. 1326) estimated the number of plague bacilli in the spleen of a mouse dead from septicaemic plague at 5–25 thousand million.

HIGUCHI and CARLIN (p. 1006) have devised a chemically defined medium for the cultivation of *P. pestis* at 27°C.; it contains 10 amino acids, D-xylose and a combination of 7 organic and inorganic salts. Cultivation at 37°C. is more difficult, even with a modified medium. KUPFERBERG and HIGUCHI (p. 1325) observe that the presence of calcium in a medium is an important factor for the growth of virulent strains of *P. pestis* at 37°C.; this requirement is not observed at 27°C. and may be related to virulence and growth *in vivo*. ENGLESBERG (pp. 35, 36) discusses mutation of *Pasteurella pestis* to the utilization of rhamnose. By radioactive methods DOMARADSKII (p. 1107) has shown that *P. pestis* utilizes cystine in culture media and forms methionine from it.

TUMANSKII (p. 1106) discusses the variants of *P. pestis* according to the capacity to ferment glycerol and form nitrites.

EISLER *et al.* (p. 1324) discuss colony morphology in *P. pestis*, and conclude that the world population of that organism is a complex of smooth and non-smooth forms, both of which may be virulent. In growth experiments smooth forms bred true, but non-smooth forms sometimes dissociated to smooth.

CRUMPTON and DAVIES (p. 156) discovered an antigen (antigen 4) in smooth strains of *P. pestis*, and this appeared to represent the only antigenic difference between smooth and rough strains; the antigen appears to favour the survival of smooth organisms *in vivo*. It is also produced by all virulent strains of *P. pseudotuberculosis*. Live smooth cultures of the avirulent strain Tjiwidej gave 20–100 times better protection to mice than killed smooth cultures of the same.

FOX and HIGUCHI (p. 649) studied the synthesis of the Fraction I antigenic protein by *P. pestis*.

Resting cells of *P. pestis* are capable of dehydrogenating a large number of substrates in the presence of phenyl tetrazolium chloride, but SRIKANTAN *et al.* (p. 397) did not find any general correlation between virulence and dehydrogenation. Succinic dehydrogenation was almost completely inhibited by chlortetracycline, and only partially by some other antibiotics. In tests of virulence of *P. pestis* BRYGOO (p. 36) in Madagascar found that 19 of 30 strains killed 100% of test mice in doses of less than 100 organisms.

SRIKANTAN *et al.* (p. 502) discuss the aldolase activity of cell extracts of virulent *P. pestis*, but note that there is no correlation between enzyme activity and virulence. Various substances, including some antibiotics (but not all), inactivated the enzyme.

In discussing the action of plague toxin AJL *et al.* (p. 885) comment that the toxin inhibits the oxidation of several compounds where diphosphopyridine nucleotide is an intermediate between substrate and oxygen. They (p. 1222) have prepared a highly purified toxin from *P. pestis* by precipitation from autolysed cultures with ammonium sulphate, and fractionation in a continuous-flow paper electrophoresis apparatus, which is described by SPIVACK and KARLER (p. 1222).

Investigation of the toxicity of filtrates of suspensions of *P. pestis* disintegrated by ultrasonic wave treatment for mice and guineapigs (which were much more resistant than mice) suggested to KEPPIE *et al.* (p. 270) that *P. pestis* contains a toxic complex which hitherto has been isolated only in part. They separated in this way 2 constituents from *P. pestis* grown *in vivo*, one highly toxic, soluble, but not protective, and the other a residue which readily immunizes guineapigs. They (p. 650) prepared a non-toxic complex from *P. pestis*, which immunizes guineapigs and mice and which was derived from the cell residue left after a suspension had several times been treated with ultrasonic waves, and washed. The cell-wall complex contains lipid and they think that the non-toxic envelope substance Fraction I is attached to it, and that this complex with its attached envelope substance is the best antigenic material, which may form the basis of an efficient dead vaccine for man.

FUKUI *et al.* (p. 502) observed a loss of virulence in *P. pestis* grown in aerated liquid cultures at 37°C., but not at 26°C. or on solid media at 26° or 37°C. The cause was probably selection of non-virulent mutants.

BURROWS and BACON (p. 1325) discuss the effects of loss of different virulence determinants on the virulence and immunogenicity of strains of *P. pestis*. The subject is complicated and details should be sought in the original.

An avirulent, non-glycerol-fermenting strain (Elis) of *P. pestis* was isolated from the nasal mucus of a horse at Elisabethville in 1950, and GIRARD (p. 156), having made numerous tests, concludes that it was derived from the well-known EV strain, but does not suggest how. The horse is a resistant animal,

non-glycerol-fermenting strains have not been found in the Belgian Congo, and there is no evidence of the disease in the Elisabethville area.

In bubonic plague the presence of pyogenic organisms in the buboes coincides with disappearance of *P. pestis,* and GIRARD (p. 1221) has been able to show antagonism between streptococci and *P. pestis in vivo* and *in vitro,* though in certain conditions there was evidence of symbiosis. The inhibiting factor in the streptococcus is not a phage. He (p. 762) describes pseudolysogenic mutants derived from *P. pestis* by bacteriophages, which exist in more or less stable equilibrium with phages. If the phage is removed or lost the organisms revert to the normal *P. pestis.* He suggests that phenomena like these may play a part in causing irregular plague cycles; free bacilli may be attacked by phage in soil or water, especially since *P. pestis* is sensitive to Enterobacteriaceae phage.

Clinical Findings: Immunity

In Madagascar, where plague has persisted for many years, BRYGOO and GONON (p. 1105) investigated an outbreak in which 35 persons died of pneumonic plague arising originally from a patient with bubonic plague. Treatment with streptomycin of 6 other patients with the pneumonic disease was successful. Contacts were isolated and treated with sulphadiazine. Pneumonic plague may appear at any time of the year, but only where the minimum temperature has dropped below 14°C. for 8 days previously. The disease is less prevalent than formerly, probably as a result of the repeated campaigns of vaccination with the EV non-virulent strain.

SEAL (p. 270) observes that ordinary agglutination or precipitation titres bear only qualitative relationship with the mouse-protection values of antiplague sera, and has devised a technique for a quantitative assessment of this relationship. This permits a quick titration of animal sera for guiding the procedures at different stages of immunization.

SPIVACK *et al.* (p. 886) note that killed plague vaccines are adequate prophylactics in guineapigs only when incorporated in adjuvants, but live non-virulent strains confer solid immunity. The antigen which confers protection is the envelope antigen, Fraction I. Hyperimmune serum confers only partial immunity to the guineapig. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

VELLA, E. E. **Malaria in an Army Community.** *West African Med. J.* 1958, Sept., v. 7 (n.s.), No. 3, 143–50, 1 map. [11 refs.]

A survey of malaria was conducted, with two objects: to ascertain how many positive malarial blood films might be expected to be found fortuitously in patients reporting sick at the army medical centres, and to estimate the

effectiveness of the army anti-malaria programme. The personnel of the military hospital at Accra, Ghana, and their families, forming a convenient, compact and static community, were chosen as an army community. The people of a nearby village were examined as controls.

The parasite rate in soldiers resident at the camp was 2·2%, compared with 15·3% in adult civilians, but it was noted that most of the soldiers dosed themselves with antimalarial drugs on experiencing any febrile symptoms. The maximum parasite rates in army children were 32·5% in the 5–7 age-group and 17·6% in the 8–10 age-group. In civilian children the maximum rate, 45·5%, was reached in the 3–4 age-group; the peak in fact was lower and occurred later in army children. 'Hospital admissions of troops for malaria declined from 119 per 1,000 in 1951 to 27 per 1,000 in 1956. The improvement is thought to be due to the completion of new camp buildings, and the comparatively unfavourable experience of a unit that has not yet been rehoused bears out this conclusion.

Protection against malarial infection results in loss of immunity. Troops themselves, if moved into field conditions, could be protected by drug prophylaxis. But their families might be subject to severe malaria if removed from a protected environment. The problem requires careful consideration.

B. B. Waddy

RAFI, S. M. **Role of Nomads in Reintroduction of Malarial Infection to West Pakistan in an Eradication Campaign.** *Pakistan J. of Health.* 1958, Apr., v. 8, No. 1, 22–4.

A campaign for the eradication of malaria throughout West Pakistan is likely to be launched. Thereafter, there will be a risk of reintroduction of the disease through the movement of uncontrolled nomads. In the "maintenance" stage of the campaign, when antimalarial measures have ended and the active surveillance mechanism for the detection of cases has been replaced by the normal vigilance of the public health service, a careful watch should be kept for primary cases in itinerants and secondary cases in their vicinity. Itinerants may be seasonal workers, immigrants intending to settle permanently, or nomads of whom there are 3 categories. The first category consists of tent-dwelling people of very low economic status, who wander from place to place within the country, seldom stopping anywhere for more than a few days all the year round. The second category, known as Pawandas, consists of nomadic merchants from Afghanistan, who generally spend several months wandering in West Pakistan, selling dried fruit, woollen carpets, etc. Since they mostly spend the months of November to April in West Pakistan, whereas the malaria transmission season is September to mid-October, they may not constitute any great danger. The third category consists of inhabitants of border areas in Baluchistan and Iran who migrate to hill country annually, returning to Pakistan to work on the date crop.

In the present investigation, 1,120 blood slides from nomads in 12 localities were examined for malarial parasites. The percentage positive varied from 15% in Gujrat to 0·9% in Lahore. In the 42 positive blood films, *Plasmodium vivax* was found in 29 and *P. falciparum* in the remaining 13. These results confirm that nomads may be a potential source of the reintroduction of malaria unless their personal infections are dealt with and their tents sprayed during the campaign.

B. B. Waddy

BRAY, R. S. **The Susceptibility of Liberians to the Madagascar Strain of *Plasmodium vivax*.** *J. Parasitology.* 1958, Aug., v. 44, No. 4, 371–3.

In view of the current belief that Negroes are relatively insusceptible to *Plasmodium vivax* [it is only the West African Negro who shows resistance], the author exposed 30 Liberians to the bites of *Anopheles gambiae* infected with the Madagascar strain of the parasite; at the same time, two "whites" were infected as controls. 1–4 mosquitoes were used for each person and the blood was then examined daily for 9 days to 2 months later and at irregular intervals up to 11 months.

Only one Liberian showed a visible blood infection, while both controls developed malaria. The first generation erythrocytic parasites in the former showed certain peculiarities: compact trophozoites with a large vacuole were followed by schizonts in which the nuclei found difficulty in dividing—the parasites thus only filled four-fifths of the corpuscle and possessed a diffuse pink nucleus resembling a microgametocyte; merozoites numbered 8–12. Schüffner's dots were invisible with ordinary staining, but the erythrocyte was pale and greatly enlarged. Later generations showed the typical features of *P. vivax*. It is pointed out that *P. wilsoni* [see this *Bulletin*, 1941, v. 38, 30] shows similar peculiarities which may be due to the sojourn of the parasite in the Negro host. The one-year-old son of this susceptible Liberian was also exposed to infection but failed to show parasites in his blood.

[See also *ibid.*, 1955, v. 52, 1165.] *P. C. C. Garnham*

SHIPITSINA, N. K. **[Effect of the shortening of Daytime on the Initial Data of Diapause in *Anopheles maculipennis* Mg.]** *Med. Parasit. & Parasitic Dis.* Moscow. 1959, v. 28, No. 1, 4–17, 9 figs. [Numerous refs.] [In Russian.]

The English summary appended to the paper is as follows:—

"The study of autumn phenology involving many observations of A. maculipennis in diverse geographical zones of the USSR rendered pheno-geographic evidence proving the changes in the rate of illumination to be the basic factor regulating the annual cycle of this species in temperate latitudes. Experimentally it was shown by A. S. Danilevsky.

"We have established that, when the shortening of the day, as compared to the annual maximum value, reaches a certain point—this serves as an outward signal to A. maculipennis indicating the forthcoming unfavorable conditions involving the end of reproduction.

"Due to the permanent nature of the changes in the duration of the day in each latitudinal zone they have become in the course of evolution signals for the discontinuation of propagation for a wide variety of insects and other animals.

"There has been established a relatively low variation of the initial dates of diapause and their correspondence to a definite length of the day in each given area in different years and in many areas of the same latitude but of a different longitude. This is due to their dependence upon one constant factor—the uniform annual rate of illumination. The firm establishment of this fact permitted to stabilize the ultimate dates of delarvation, which, in most areas of the USSR, are set up according to the initial dates of diapause (N. K. Shipitsina, 1950, 1951).

" The individuals of all generations, with the possible exception of the first generation, are proved to have the same capacity for sexual activity and are potentially gonoactive or diapausing, depending upon the rate of illumination.

" There is no direct relationship between the initial date of diapause for mosquitoes and thermal conditions for the development of the water phases. Diapause sets in during the period of high summer temperatures. Weather differences, particularly those of temperature, cause only slight changes of the dates of mass appearance of diapausing mosquitoes in each individual area during any given year (within the limits of not more than 2–2½ weeks).

" Along the same latitudinal zones the threshold of adaptive reactions varies depending upon the continental character of the climate. Thus, the more continental and severe climate and the earlier setting in of autumn—the lower threshold of photoperiodic reactions (oriental part of the USSR, mountain regions).

" Within the latitudes of 65°–40° the massive setting in of diapause for A. maculipennis populations begins in the extreme North with the duration of the day equal to 20 h. 15 min. and in the Transcaucasus, in the case of A. m. sacharovi—with the daylight lasting 12 h. 25 min. The difference in the threshold length of the day for northern and southern populations comprises 6–8 hours. With the latitudinal change of 5° the critical duration of the day characterizing the photoperiodic reaction shows an approximate variation of 1–1½ hours. For northern population the critical length of the day, characteristic for the beginning of diapause, is substantially greater than for the southern ones ; this finding has its ecological explanation in the earlier temperature drop, limiting further multiplication of the species.

" It is possible that the adaptation of mosquitoes to the light and temperature regime existing in individual areas results in the formation within the species of geographic populations, distinguished by their ecological requirements (A. S. Danilevsky, 1957).

" There is possibility of yet another explanation. The ample phenological information collected throughout the immense territory of the USSR proves, that in our case the shortening of the day by a definite number of hours is a significant factor, identical for the most part of the area of this species in the USSR. Which of these two hypotheses is just is to be proved by experiments."

KOGAY, E. S. [**Ecology of the Larvae of** *Anopheles hyrcanus* **Pall.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1959, v. 28, No. 1, 28–32. [In Russian.]

The English summary appended to the paper is as follows:—

" The most typical and favourable breeding places of A. hyrcanus in the rice-cultivating districts of Uzbekistan are rice-fields, reedy swamps and drainage with water rich in calcium hydrocarbonate.

" The main breeding of A. hyrcanus occurs from March to April in permanent waters not overshaded and thoroughly warmed by the sun ; in summer in all types of basins well overshaded by plants, including rice-fields and in autumn —in sun-lighted basins again.

" The maximum density of the larvae A. hyrcanus in all types of basins was observed in August and the minimum in spring (April–May) and in autumn (October).

" The duration of embryonic development of A. hyrcanus fluctuates depending upon the temperature (16°–30°) from 1 to 6 days. The optimum conditions for the post-embryonic development are observed under the temperature of 27°–28°. Under all temperatures the development of A. hyrcanus was more rapid than indicated by the Bodenheimer's formula, i. e. faster than in the case of A. maculipennis under the same temperatures."

MARCHAL, E. Variation de la population anophélienne d'une mare à salinité variable de la région de Konakri (Guinée française). [**Variation in the Anopheline Population in Pools of Varying Salinity in the Konakri Region, French Guinea**] *Bull. Inst. Français d'Afrique Noire.* Ser. A. 1959, Jan., v. 21, No. 1, 180–203, 4 figs. [20 refs.]

The author has investigated the population of *Anopheles* larvae in small saline pools, situated among the plants *Paspalum vaginatum* and *Sesuvium portulacastrum* near the sea shore, and liable to be diluted by rain water. The salinity of the water in the pools, measured between July and October 1956, fluctuated between 0·4 and 15·3 gm. NaCl/litre. *Culex thalassius* was also found breeding in the pools. Anopheline larvae collected during this period could be classified, from the shape of the pecten, into two *Anopheles gambiae* type form, 23 *A. gambiae melas* and 53 of an " intermediate " form. Some of the " intermediate " forms are figured. The author reviews the history of the separation of the two forms of *A. gambiae,* and considers the possibility that the two forms may interbreed in nature. *B. R. Laurence*

BRUCE-CHWATT, L. J. & GIBSON, F. D. **Chloroquine per Rectum for Malaria in Children.** *Brit. Med. J.* 1959, Apr. 4, 894–6. [15 refs.]

The treatment of malarial attacks in children by suppositories of chloroquine has been practised during recent years in Vietnam and in other French overseas territories [this *Bulletin,* 1952, v. 49, 115 ; 232]. The object of the investigation recorded in this paper was to evaluate the comparative parasiticidal action of the drug when given per rectum or by mouth, and also to determine the respective rates of urinary excretion of the chloroquine base.

The subjects of the trial were 28 African children admitted to the Royal Orthopaedic Hospital at Igbobi, near Lagos, Nigeria, for various bone and joint diseases and found to be infected with *Plasmodium falciparum* malaria. The mean age of the children was 6·8 years.

One group of 10 children received chloroquine sulphate by mouth in a single dose containing 300 mgm. of base. The other group comprising 18 children was subdivided, one subgroup (12) receiving a single chloroquine suppository containing 300 mgm. of base, the other (6) receiving one such suppository every day for 5 days (total 1,500 mgm. of chloroquine base).

The single intrarectal dose cleared only 38% of children of *P. falciparum* schizonts, against 100% when the same dose of chloroquine was given by mouth.

With 5 repeated daily doses, the action of chloroquine suppositories was complete though slow, with a clearance time of 3 days.

Chloroquine given orally was found to be far better absorbed, its urinary excretion averaging 20% of the total amount of drug administered; the respective figure for intrarectal chloroquine did not exceed 5%.

It is concluded that chloroquine suppositories cannot replace the more usual methods of administration of this drug, particularly when speed of action is of importance, though they might be found useful in paediatric practice in certain special circumstances. *G. Covell*

LOZANO MORALES, A. & VELAZQUEZ GAZTELU, F. Las 4-aminoquinoleinas en la erradicación del paludismo. Valoracion epidemiológica de una y dos dosis de 600 miligramos de camoquin. [**The 4-aminoquinolines in Malaria Eradication. Trials with One and Two Doses of Camoquin**] *Riv. di Malariologia.* 1958, Dec., v. 37, Nos. 4/6, 257–62. English summary.

The authors, from the Spanish National Antimalarial Institute, have tried treatment of malaria with camoquin [amodiaquine] in single and double doses of 600 mgm. each and have compared their results with those obtained previously with a total dose of 1800 mgm. [presumably of a 4-aminoquinoline as the salt].

Dosage by age-groups was as follows:— up to 5 years old, 200 mgm.; 6–9 years old, 400 mgm.; 10 years and upwards, 600 mgm. All the infections were caused by *Plasmodium vivax* and the results with one dose were:— primary infections, 5 cases—1 relapse; relapse cases, 27—8 relapses. The dose of camoquin was then doubled (2 × 600 mgm. at 6-hour interval) and the results were (all *P. vivax* infections):— primary infections, 33—2 relapses; relapse cases, 28—3 relapses.

Although these results did not compare with those obtained with 1800 mgm. of other 4-aminoquinolines, the authors consider that in eradication campaigns a dose of 1200 mgm. (2 × 600 mgm. with a 6-hour interval) will prove satisfactory. *W. K. Dunscombe*

SOBERÓN Y PARRA, G.; PÉREZ REYES, R.; VARGAS, L. Actividad de la asociación primaquina-pirimetamina [SOBERÓN Y PARRA]. *Gac. Méd. de México.* 1957, Sept., v. 87, No. 9, 659–60. I. Estudio experimental en palomas (*Columbia livia*) infectadas con *Plasmodium relictum* [SOBERÓN Y PARRA & PÉREZ REYES]. *Ibid.*, 661–5. II. Estudio en infecciones humanas por *P. vivax* y *P. falciparum* [SOBERÓN Y PARRA & PÉREZ REYES]. *Ibid.*, 666–72. [16 refs.] III. Comentarios al trabajo del Dr. Galo Soberón y Parra [VARGAS]. *Ibid.*, 673–6. [**Activity of Primaquine and Pyrimethamine in Combination. I. Experimental Study in Pigeons infected with *Plasmodium relictum*. II. Study in Human Infections with *P. vivax* and *P. falciparum*. III. Commentary on the work of Dr. Soberón y Parra**]

Soberón y Parra died as the result of an accident shortly before his sixtieth birthday on August 1, 1956; he was head of the malaria control campaign in Mexico and had worked extensively on many aspects of malaria research in the field and in the laboratory. The unpublished results of his work are presented here by his collaborator, Pérez Reyes, and a sympathetic obituary

is contributed by Vargas—all these communications were made at a special session of the National Academy of Medicine of Mexico, of which Soberón had been President of the Tropical Diseases Section.

The work relates to the interesting synergic effect of pyrimethamine and primaquine, in the first paper on *Plasmodium relictum* in pigeons (*Columbia livia*) and in the second on *P. vivax* and *P. falciparum* in man.

50 young pigeons were inoculated with the IE strain of *P. relictum* and were subjected to various doses of the combined drugs, while 15 birds were left as untreated controls. The drugs were inoculated twice daily for 5 days, and blood films were examined up to the thirteenth day. 4·0 mgm. (= 50% minimal effective dose) per kgm. of primaquine (base) and 0·2 mgm. (= 50% minimal effective dose) of pyrimethamine as the daily dose succeeded in keeping the blood clear of parasites up to the thirteenth day; 2 mgm. and 0·05 mgm., respectively, completely failed.

Treatment of the human disease was carried out on 220 people in the states of Morelos and Guerrero, of whom 95 had *P. vivax*, 21 *P. falciparum*, and 104 did not show parasites. The treatment consisted of 30 mgm. of primaquine base and 75 mgm. of pyrimethamine for an adult (and less for children) as a single dose. 96% of the *P. vivax* and 91% of the *P. falciparum* infection disappeared in 48 hours. Such dosages are considerably less than the minimum effective doses reported in the literature for the drugs used singly and clearly suggest that a synergic effect was obtained. This may have an important significance in malaria eradication campaigns. *P. C. C. Garnham*

YOUNG, M. D. & BURGESS, R. W. **Pyrimethamine Resistance in** *Plasmodium vivax* **Malaria.** *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 1, 27–36, 2 figs.

Pyrimethamine in single doses of 25, 50, 100 or 200 mgm. was given to 17 white neurosyphilitic patients who had been infected with one or other of 3 different geographical strains of *Plasmodium vivax*, the object being to test the schizontocidal and sporontocidal effects of the drug. The first single-dose treatment with 25 or 100 mgm. was given between the 8th and 61st days of parasite patency and resulted in moderately rapid schizontocidal and very rapid sporontocidal effects. All the observed cases relapsed.

The second single dose treatment, usually 3 weeks or longer after the first and with the same or higher doses, had either a diminished effect or none at all on the schizogonous and sporogonous cycles. Subsequent treatment, even at weekly intervals, had no effect.

Resistance persisted undiminished when challenged by subsequent attempts to transmit infections by mosquito bites, by the injection of preserved sporozoites or by transfusion of infected blood. The authors point out that their results indicate that resistance could also occur under field conditions when large single doses of pyrimethamine alone are given at less than monthly intervals to patients suffering from active *P. vivax* infections.

[This paper provides further evidence, if such were needed, to support the contention put forward by the abstracter 6 years ago that pyrimethamine unaided is unsuitable for the treatment of active malaria in non-immune subjects (this *Bulletin*, 1953, v. 50, 907).] *G. Covell*

BURGESS, R. W. & YOUNG, M. D. **The Development of Pyrimethamine Resistance by** *Plasmodium falciparum*. *Bull. World Health Organization*. Geneva. 1959, v. 20, No. 1, 37–46, 2 figs.

Pyrimethamine in single doses of 25, 50 or 100 mgm. was given to 16 Negro neurosyphilitic patients who had been infected with one or other of two different strains of *Plasmodium falciparum*, 15 by injection of infected blood and one by mosquito bite. The schizontocidal and sporontocidal response was rapid.

7 blood-induced infections, 3 treated with 100 mgm. and 4 with 50 mgm., did not relapse. Of 7 observed after 25 mgm. treatment, 5 relapsed. Delayed treatment of the relapsing infections with single doses of 25 or 50 mgm. and subsequently 100 mgm., had virtually no schizontocidal or sporontocidal effect. In one case the resistant infection was transmitted by mosquitoes to another patient; the subsequent infection was also highly resistant to the drug.

The authors conclude that under the conditions of their experiments resistance to pyrimethamine by *P. falciparum* may occur rapidly after a single dose of 25 mgm., that an increase of drug dosage does not overcome the resistance, and that the resistant character is readily transmitted by mosquitoes.

G. Covell

CLYDE, D. F. **Multiple Infections of** *Plasmodium falciparum* **susceptible and resistant to Pyrimethamine.** *Riv. di Malariologia*. 1958, Dec., v. 37, Nos. 4/6, 263–76, 2 figs.

SMITH, C. C. & IHRIG, Jean. **Persistent Excretion of Pyrimethamine following Oral Administration.** *Amer. J. Trop. Med. & Hyg.* 1959, Jan., v. 8, No. 1, 60–62. [11 refs.]

Earlier experiments by the authors [this *Bulletin*, 1957, v. 54, 1048] have shown that pyrimethamine is excreted slowly in man after oral dosage. The pattern of urinary excretion of the drug and the persistence of serum levels have been determined. 10 healthy human volunteers were each given 100 mgm. doses. Blood samples were collected for 1 to 10 days and 24-hour urinary samples from 20 to 62 days after dosage. Later, urinary excretion of the drug was determined in the same subjects after a single 0·25 and 1 mgm. dose. The chemical and biological methods used for estimation were those described earlier [*ibid.*, 1953, v. 50, 85, 481]. Serum levels over 0–30 days after dosage are recorded in a table, the value for the longest period being obtained by extrapolation.

From the data obtained it was concluded that after a 100 mgm. dose the human subject, at the end of a 30-day period, retains about 1 mgm. of the original dose. Beyond the 40th day after administration there is only negligible excretion. The period of protection afforded by oral dosage could also be estimated. The danger of giving large, but widely spaced, doses is that resistance to the drug may arise [*ibid.*, 1957, v. 54, 1386; 1958, v. 55, 733].

J. D. Fulton

CLYDE, D. F. **Drug Prophylaxis of Malaria amongst Premunized Schoolchildren.** *East African Med. J.* 1959, Jan., v. 36, No. 1, 12–25, 1 graph. [30 refs.]

The investigations described in this paper were conducted in the vicinity of Muheza, a highly malarious area in north-east Tanganyika. Part 1 is devoted to a discussion of the advisability of drug prophylaxis of malaria among premunized schoolchildren, while Part 2 deals with the dosages of the antimalarial drugs found necessary for this purpose.

The author concludes that regular chemoprophylaxis of malaria improves the general health and efficiency of the children to some extent and decreases absenteeism by one week per year per child. It does not interfere with existing immunity when continued regularly over a period of 20 months.

The doses found adequate to protect these children, irrespective of age were:

Mepacrine	300 mgm. weekly
Chloroquine base	75 mgm. fortnightly (1st dose 150 mgm.)
Amodiaquine	100 mgm. fortnightly (1st dose 200 mgm.)
Proguanil	300 mgm. weekly
Pyrimethamine	25 mgm. weekly.

The cost of protection of a child for one school term of 12 weeks was: for chloroquine, 0·66 shilling; for amodiaquine, 1·05 shillings; for mepacrine or pyrimethamine, 1·44 shillings; and for proguanil, 1·62 shillings.

G. Covell

MOSNA, E., PALMIERI, C., ASCHER, K. R. S., RIVOSECCHI, L. & NERI, I. **Studies on Insecticide-Resistant Anophelines. 2. Chromosome Arrangements in Laboratory-Developed DDT-Resistant Strains of** *Anopheles atroparvus*. *Bull. World Health Organization*. Geneva. 1959, v. 20, No. 1, 63–74. [13 refs.]

A susceptible strain of *Anopheles maculipennis atroparvus* originating from Ferrara has been selected in Rome over the past 3 years and over more than 30 generations with DDT, in three ways: — (1) by selection of adult males and females within 24 hours of emergence by exposing them to dosages of DDT in Risella oil on filter paper giving a 50% kill or more; (2) by exposure of larvae in their first instar and later in their third instar to alcohol-water mixtures of DDT; (3) by selection in the 1st and 3rd larval instars as in (2) and later selection of surviving females only as in (1).

An increased tolerance to DDT soon appeared, as witnessed most clearly by the change in exposure time from 1 hour to 24 hours necessary to give significant kills of adults when exposed to 4% DDT in Risella oil. It is not possible to calculate a degree of resistance from these tarsal contact tests because of the different exposure times involved, but compared with the parent strain the 32nd adult selected strain showed 1,000 times more tolerance when exposed to dry DDT residues from acetone solutions.

The results of larval tests and adult topical application tests also indicated marked increases in tolerance. Larval selection over 32 generations, for example, raised the LC50 63 times.

As the authors point out, this high degree of resistance would appear to be more than just increased vigour and this is confirmed by the selected strains

retaining their tolerance in the absence of selection. It is almost certain that with such a high degree of tolerance it should be possible to find discriminating dosages of DDT separating the parent and selected strains and their hybrids, and then to work out whether in fact specific genes are involved.

The three testing techniques used, *viz.*, tarsal contact, topical application and larval exposure, are shown to give differing orders of tolerance of the three selected strains. Tarsal contact tests place the adult selected strain as showing the highest tolerance and the larval selected strain as showing the lowest. Topical application tests show the adult selected strain to be lowest in tolerance of the three, while larval exposures show the larval selected strain to be highest in tolerance. These findings are vaguely related to two current theories of physiological mechanisms involved in resistance: the "lipoid barrier" mechanism and the dehydrochlorination mechanism. It is mentioned that some investigation on the former mechanism is going on but no reference is made to a search for DDE-production in the selected strains which might give further evidence in favour of specific resistance rather than "vigour tolerance".

The results are given of examination of the left arm of the third chromosome in these three selected strains and in another which has been selected in the larval stage for 28 generations with dieldrin. The latter strain in its 32nd generation of selection, as well as showing a slight increased tolerance to dieldrin (2–3 times), also showed a slightly increased tolerance to DDT; in this strain 77·4% showed heterozygous inversions [see this *Bulletin*, 1959, v. 56, 11] compared with 12–21% in four normal or seminormal strains from Italy, Sicily, Hamburg and Rumania. Adult selection by DDT on the other hand produced little or no change in the heterozygous inversions in the left arm of the third chromosome (24·4%), while larval and adult selection both result in an increase to 54 and 55%, respectively, in these inversions. The conclusion is that larval selection changes the frequency of heterozygous inversions but that this frequency is independent of the degree of resistance.

[For Part I, see *ibid.*, 1959, v. 56, 11.] *G. Davidson*

GILROY, A. B. **Malaria Control on Tea Estates in Assam, 1947–1956.** *Indian J. Malariology*. 1958, Sept., v. 12, No. 3, 157–64.

In rural Assam the tea estates on which malaria is controlled are dispersed through the uncontrolled area like islands, and often have an uncontrolled village near-by with which there is considerable traffic. Between 1947 and 1951 insecticides together with chemo-suppressives were used to control malaria. Urine tests revealed, however, that only 56% of those claiming to have swallowed their proguanil tablets had done so. An efficient insecticide programme was therefore developed as the sole malaria control measure. BHC was found better than DDT, because of its fumigant action after adsorption by mud walls, and it was applied by stirrup pump in a dosage of 11 mgm. of the gamma isomer per square foot at intervals not exceeding 6 weeks. This relatively low concentration frequently applied was adopted because up to 20% of houses were replastered between insecticide applications in spite of appeals.

The only malariometric indices used were the malaria morbidity rate usually confirmed by finding parasites, and the spleen rate in children aged 2 to 9. The morbidity rate declined from 151 per 1,000 in 1947 to 12 per 1,000 in 1956 in spite of the proximity of uncontrolled villages. The spleen rate fell

from 18% in 1947 to 1·5% in 1956. There are indications that when it fell below 5% the spleen rate became insensitive and an unreliable indicator. It should not exceed 1·0% in an efficient and prolonged control programme.

T. H. Davey

GILROY, A. B. & SCOTT, A. **The Infant Parasite Rate on some Assam Tea Estates.** *Indian J. Malariology.* 1958, Sept., v. 12, No. 3, 165–9.

On the tea estates studied malaria was controlled by spraying the estate houses with BHC. Control measures had reduced the malaria morbidity from 463 cases per 1,000 in 1946 to 18 per 1,000 in 1957 and the spleen rate from 49% to 0·4% in the same period. In order to assess the amount of transmission still going on, the blood of 333 infants born during the first 6 months of the year was examined fortnightly by thick and thin blood smears, commencing in the first week of July. Excluding infants who failed to complete the tests or who had spent one or more nights away from their homes, there were 286 of whom 14 were infected with malaria (4·9%). None of these was positive on more than one examination. It is probable that a number of earlier infections were missed and that the malaria rate would have been higher. 11 of the infections occurred during or before August and only 3 afterwards.

It was concluded that the persistence of the disease should be attributed to the uncontrolled villages in the vicinity of estates and that eradication of malaria from the limited area of the estates would not be possible though control could be highly successful. No reliance could be placed on the spleen rate, however low, as an indicator of residual transmission, and only a zero rate would be acceptable in an eradication campaign. *T. H. Davey*

GARNHAM, P. C. C., LAINSON, R. & COOPER, W. **The Complete Life Cycle of a New Strain of *Plasmodium gonderi* from the Drill (*Mandrillus leucophaeus*), including its Sporogony in *Anopheles aztecus* and its Pre-Erythrocytic Schizogony in the Rhesus Monkey.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Nov., v. 52, No. 6, 509–17, 20 figs. (8 coloured) on 2 pls. [11 refs.]

An account is given of the complete life cycle of *Plasmodium gonderi*, a new strain of which was isolated in the Cameroons from a drill, *Mandrillus leucophaeus*, a host from which this parasite had not hitherto been recorded.

The erythrocytic development of this parasite was studied in blood films, which were taken from the original host and from subinoculated Rhesus monkeys, and stained by Giemsa's method, after preliminary drying in the air or fixation in Bouin's fluid. Sporogony was studied in *Anopheles aztecus* and *A. maculipennis* var. *atroparvus*. For the study of tissue stages, the mosquitoes were infected by feeding on the drill, and suspensions of the salivary glands containing sporozoites were inoculated intravenously into Rhesus monkeys. Portions of their livers, removed by biopsy at various intervals, were fixed in Carnoy's fluid, sectioned and stained by the Giemsa-colophonium method.

The new strain conforms to the type-species, *P. gonderi* (with which it was compared) in its tertian periodicity, cross-immunity and morphology, though it differed in some minor characters. In the mosquitoes, sporogony proceeded, with invasion of the salivary glands by sporozoites in 9 days. The development

in the tissues, taking place in the parenchyma cells of the liver, is limited to the pre-erythrocytic phase, which terminates in the release of merozoites 8 days after inoculation of the monkeys. The 5-day schizonts measured 9 × 8 μ and 13 × 19 μ and contained 15–20 nuclei; the 7-day forms measured from 23 × 18 μ to 27 × 22 μ and contained numerous nuclei; the 8-day forms reaching maturity measured 22·5 × 22·5 μ to 32 × 27 μ. In the larger forms the cytoplasm was divided into cytomeres, while in a mature form measuring 63 × 22 μ about 2,000 merozoites were produced.

In discussing the morphology of the pre-erythrocytic forms, the authors note the striking difference between *P. gonderi* and some other species of malaria parasites, while its nuclear structure is similar to that of *P. knowlesi* and *P. ovale*.

The paper is illustrated by a plate of superb coloured figures, as well as by a half-tone plate, depicting the tissue and blood stages of *P. gonderi*.

C. A. Hoare

NAKAMURA, S. [**Infection of** *Plasmodium berghei* **(Rodent Malaria Protozoa) in Mouse Body and Relationship to Health Hazard Insects**] *J. Osaka City Med. Center.* 1958, Jan., v. 7, No. 1, 45–61, 1 chart. [69 refs.] [In Japanese.] English summary.

Plasmodium berghei was inoculated into mice in various quantities. A massive dose (more than 1000 × 10^4) gave rise to infection in 24 hours, which reached a density as high as 82% invasion of erythrocytes, while a low dose (less than 100 × 10^4) gave rise to infection in 2–3 days which was followed by a slight parasitaemia. *Xenopsylla cheopis* fleas were allowed to feed on infected blood, and emulsions made from the fleas' viscera up to an hour after feeding proved infective when inoculated into mice. The following mosquitoes failed to become infected after feeding on mice, said to contain gametocytes in the blood: *Culex pipiens* var. *pallens* (301), *Aëdes albopictus* (245) and *Anopheles hyrcanus* var. *sinensis* (93).

P. C. C. Garnham

BOX, Edith D. & GINGRICH, W. D. **Acquired Immunity to** *Plasmodium berghei* **in the White Mouse.** *J. Infect. Dis.* 1958, Nov.–Dec., v. 103, No. 3, 291–300, 4 figs. [18 refs.]

As is known, *Plasmodium berghei* causes an acute and fatal infection in mice, but the infection is curable with 8-aminoquinolines [this *Bulletin,* 1954, v. 51, 774]. The present study is concerned with the response of mice to reinoculation at different periods of time after the cure, and with the effect of splenectomy upon their immunity.

It was shown that mice, whose infection was eradicated by drug treatment, were immune to reinfection since the majority of animals survived when challenged by reinoculation of *P. berghei,* in contrast to 100% mortality in untreated mice. This immunity lasted for 3 months, which was the longest period at which the animals were challenged. However, almost all the mice that were splenectomized after drug treatment succumbed to reinfection, although their survival time was longer than in control animals with primary infections. In both immunized and control mice parasitaemia showed a crisis after 4–5 days and rose up to the seventh day, after which infection in the

unoperated immune mice was inhibited, whereas the splenectomized immune and control animals died.

Observations with paper strip electrophoresis on the sera of the experimental animals showed that in cured challenged mice there was a higher rise in gamma globulin than in mice with primary infections. *C. A. Hoare*

ZUCKERMAN, A. **Blood Loss and Replacement in Plasmodial Infections. II.** ***Plasmodium vinckei*** **in Untreated Weanling and Mature Rats.** *J. Infect. Dis.* 1958, Nov.–Dec., v. 103, No. 3, 205–24, 5 figs.

This paper, which is the second of a series devoted to factors affecting the course of infection and immunity in malaria infections, deals with *Plasmodium vinckei* infections in weanling and adult rats. The procedure and methods of assessment of the results of the observations were the same as those described in the preceding study of *P. berghei* [this *Bulletin,* 1957, v. 54, 1391].

Inoculation of the parasites produced infection in all the rats, except one weanling. In the adults parasitaemias were low, while blood loss after infection exceeded that which might be due to destruction of red cells by proliferating parasites, anaemia being most pronounced when parasitaemia was in decline. The excessive blood loss is attributed to the production of an immune auto-antibody and there was no recognizable reparative reticulocytosis. In weanling rats parasitaemias varied from low (1%) to very high (81%). As in the case of adult animals, there was excessive blood loss, but it was less extensive. However, in the case of low parasitaemias the loss was proportional to the degree of parasitaemia, whereas in high parasitaemias there was no such correlation. There was likewise no reticulocytic response to anaemia in mild infections, but it was marked in those in which parasitaemia was above 5%. Reparative reticulocytosis was proportional to the degree of parasitaemia in mild, but not in severe infections. The absence in *P. vinckei* of a predilection for reticulocytes [this *Bulletin,* 1953, v. 50, 913]—which distinguishes it from *P. berghei*—is reflected in the fact that its merozoites show no preference for any particular type of host-cell but invade those red cells that predominate at the time.

A comparison was made of blood loss and replacement in *P. vinckei* and *P. berghei.* In the former infections were milder and peak parasitaemias were lower, anaemia was less pronounced and reparative reticulocytosis in mild infections was negligible. In the case of both species, there was excessive loss of blood and reparative reticulocytosis followed a similar pattern. Also in both cases natural and acquired immunity in adult rats was more effective than in young animals. *C. A. Hoare*

VAN DEN BERGHE, L., LAMBRECHT, F. L. & ZAGHI, A. Démonstration du cycle sexué de *Plasmodium atheruri* n. sp. au Congo belge. [**Demonstration of the Sexual Cycle of** ***Plasmodium atheruri*** **in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1958, Oct. 31, v. 38, No. 5, 977–81, 1 diagram.

The English summary appended to the paper is as follows:—

"The authors have found a sporozoite index of 24 % in *Anopheles van thieli* captured inside shelters occupied by *Atherurus africanus* infected by

Plasmodium atheruri. Similar anopheles found in sites which have been abandoned by *Atherurus africanus* for some time, were always free of sporozoites.

" The sporozoites of *Plasmodium atheruri* are described. Transmission has been carried out on 2 Atherurus."

VAN DEN BERGHE, L., PEEL, E., CHARDOME, M. & LAMBRECHT, F. L. Le cycle asexué de *Plasmodium atheruri* n. sp. du porc-épic *Atherurus africanus centralis* au Congo belge. [**The Asexual Cycle of** *Plasmodium atheruri*, **n.sp. in the Porcupine** *Atherurus africanus centralis* **in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1958, Oct. 31, v. 38, No. 5, 971–5, 1 graph & 8 coloured figs. on pl.

The English summary appended to the paper is as follows:—

" Description of the erythrocyte cycle of a plasmodium of *Atherurus africanus centralis* Thomas. Rounded or oval trophozoites and schizonts in unaltered red cells. Division into 4 merozoites with pigment in the centre of the rosette. Rounded or crescent-shaped gametocytes."

MCGHEE, R. B. **The Effect of Lowered Temperatures of the Host on the Reproductive Activity of** *Plasmodium cathemerium*. *J. Protozoology*. Utica. 1959, Feb., v. 6, No. 1, 84–8, 5 figs.

" Experiments were carried out to determine if the course of infection with *Plasmodium cathemerium* was changed when the temperature of incubation of the duck embryo host was lowered. At 30° C. the infection developed more slowly and never reached the peak seen in infected embryos incubated at 37° C. If infected embryos at 30° were returned to 37° C. the resultant parasitemia developed similarly to that usually seen in this host at the latter temperature. Studies of the periodic behavior of the parasite at 30° C. and 38° C. revealed no differences in the time of segmentation. Merozoite counts were unchanged. The reduced parasitemia in embryos at 30° C. may result from reduced ability of the parasite to penetrate new host cells."

ČERNÁ, Z. Příspěvek k poznání plasmodií u koroptví. [**Observations on** *Plasmodium* **Infection in Partridges**] *Věstn. Českoslov. Zool. Spol.* Prague. 1958, v. 22, No. 1, 73–8, 8 figs. [19 refs.] German summary (9 lines).

A massive infection with a parasite provisionally identified as *Plasmodium relictum*.

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

HEISCH, R. B., MCMAHON, J. P. & MANSON-BAHR, P. E. C. **The Isolation of *Trypanosoma rhodesiense* from a Bushbuck.** *Brit. Med. J.* 1958, Nov. 15, 1203–4.

It has always been thought that *Trypanosoma rhodesiense* has reservoir hosts among wild animals, but this belief was hitherto supported only by strong circumstantial evidence, provided by cases of human infection acquired in uninhabited areas from tsetse flies presumably infected from local game animals [this *Bulletin,* 1956, v. 53, 415]. The only previous attempt to substantiate this hypothesis, by isolating *T. rhodesiense* from wild animals in endemic areas, was unsuccessful [*ibid.,* 1958, v. 55, 1307]. In the present paper the authors record for the first time the isolation of this trypanosome from bushbuck and its successful inoculation in man, thereby proving beyond all doubt that Rhodesian sleeping sickness is in fact a zoonosis.

The experiment in question was carried out on Utonga Ridge in the Nyanza Province of Kenya, which projects into Lake Victoria. In this area the Rhodesian disease is endemic and *T. rhodesiense* had been isolated from local tsetse, *Glossina pallidipes.* In the course of 5 months in 1958, 24 animals (23 antelopes and one serval cat) were shot and their blood was inoculated into rats. Among the strains thus isolated, one from duiker and 2 from bushbuck (*Tragelaphus scriptus*), belonging to the *brucei* group, were inoculated into human volunteers; one of these (a European) became infected after inoculation into the forearm with 0·25 ml. of blood from a rat infected with a bushbuck strain, containing numerous trypanosomes. [In the original paper the dose of inoculum is erroneously given as 25 ml., but this error was subsequently corrected by one of the authors in *Brit. Med. J.,* 1959, Jan. 17, 186.] On the seventh day there appeared a local skin reaction, in which trypanosomes were detected, and on the eighth day parasites were seen in the blood. On that day the patient's temperature rose to 103°F. (39·4°C.) and next day to 106·9°F. (41·6°C.), after which he was treated with antrypol and recovered.

[Following the old tradition, the authors still refer to members of the *brucei* group as "polymorphic trypanosomes" without any further qualification. However, this practice is misleading in view of the fact that *T. simiae* is also a polymorphic species (see this *Bulletin,* 1936, v. 33, 647; 1948, v. 45, 313).]

C. A. Hoare

GORDON, R. M. & WILLETT, K. C. **Studies on the Deposition, Migration, and Development to the Blood Forms of Trypanosomes belonging to the *Trypanosoma brucei* Group. III. The Development of *Trypanosoma rhodesiense* from the Metacyclic Forms, as observed in Mammalian Tissue and in Culture.** *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 346–65, 4 figs. & 6 pls. (1 coloured). [41 refs.]

In previous studies of the initial development of *Trypanosoma rhodesiense* in the mammalian host [this *Bulletin,* 1957, v. 54, 270, 544; 1958, v. 55, 636],

it was shown that, when metacyclic forms were injected by tsetse flies into the skin, the trypanosomes almost immediately invaded the blood stream, irrespective of whether a local skin reaction (chancre) was produced at the site of the bite (as in rabbits) or not (as in rats and guineapigs). In the present paper the authors describe the course of development of this trypanosome from metacyclic to blood forms, studied by them in stained sections and smears of the skin or chancre at the site of inoculation by infected tsetse flies, as well as *in vitro,* in a modification of Ringer's glucose at 37°C.

The findings *in vivo* varied according to the host used in the experiments. In guineapigs metacyclic trypanosomes were found in the tissue immediately after deposition by the biting fly, after which no flagellates could be detected in the bitten area during the incubation period, though their presence there was demonstrated by infection of rats inoculated with the tissues 20–45 minutes after the bite. There was therefore no evidence of the development of the metacyclics in the tissue of these animals. In rabbits trypanosomes were not seen in the bitten area till 72 hours after infection, indicating that the metacyclics developed locally. From then onwards and till the end of the incubation period trypanosomes were seen in sections and tissue-juice removed at 24-hour intervals. At the end of 72 hours their numbers were scanty but they increased steadily up to the end of the incubation period, after which their numbers in the chancres diminished rapidly. Morphologically the trypanosomes in the chancres corresponded to the slender forms seen in the blood in the early stages of its invasion. In 2 monkeys, infected cyclically, no local skin reaction developed, and blood taken from one of them 72 hours after the bite infected a rat. In rabbits—as in man—a local reaction in the form of a chancre develops at the site of the bite by infected tsetse 3–7 days later. Histologically it is characterized by oedema and infiltration with numerous mononuclear histiocytes and fewer eosinophils, and trypanosomes present throughout the affected area.

The actual transformation of metacyclic forms into blood forms of *T. rhodesiense* was observed in the medium mentioned above, which was inoculated with flagellates recovered from the salivary glands of infected flies and incubated at 37°C. The results of examination of samples taken at various intervals were as follows: after 15–20 minutes the metacyclic forms were still unaltered, but in the course of the next 8 hours their body gradually elongated and a free flagellum developed, so that by the end of this period the flagellates were like the long slender blood forms, while in samples examined 17–24 hours after incubation dividing trypanosomes made their appearance. These forms were seen in the " cultures " up to 48 hours, but in most cases the trypanosomes did not survive *in vitro* after 72 hours.

The authors adduce arguments in support of their view that the development of the metacyclic trypanosomes observed by them *in vitro* corresponds to that taking place *in vivo, i.e.,* that they are transformed directly into slender blood forms. As regards the stumpy forms, they are absent during the incubation period but first appear in the blood some days after it has become positive. The authors also believe that the early development of *T. rhodesiense* in man is probably similar to that observed by them in experimental animals and *in vitro.* Among the factors determining the transformation of metacyclic trypanosomes into blood forms, they consider changes (a) of temperature and (b) of the chemical composition in the surrounding medium.

The course of development outlined above is convincingly illustrated by numerous figures. *C. A. Hoare*

MOUCHET, J., GARIOU, J. & RATEAU, J. Distribution géographique et écologique de *Glossina palpalis palpalis* Rob.-Desv. et *Glossina fuscipes fuscipes* Newst. au Cameroun. [**Geographical and Ecological Distribution of *Glossina palpalis* and *G. fuscipes* in the Cameroons**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 652–61, 1 map. [16 refs.]

The distributions of *Glossina palpalis palpalis* and *G. fuscipes fuscipes* in the Cameroons have been studied in detail and the areas occupied by the two species are shown on a map. *G. palpalis* is found on the coast and extends inland to occupy approximately the south-west third of the country. *G. fuscipes* occupies mainly the remaining two-thirds of the area to the north and east. Isolated foci inhabited by *G. palpalis* exist in the *fuscipes* area, at Doumé and Yokadouma, but there are no similar isolated foci of *fuscipes* in the *palpalis* area. On the other hand, *fuscipes* appears to be penetrating into the *palpalis* areas along the rivers Nyong and Sanaga. Here, *fuscipes* is found on the larger rivers and *palpalis* along the smaller tributaries. The evidence, from the present distribution of the two species, suggests that *fuscipes* may be replacing *palpalis* in this part of West Africa. *B. R. Laurence*

VAN DEN BERGHE, L., CHARDOME, M. & PEEL, E. Les trypanosomes transmis par *Glossina morsitans* au Mutara (Ruanda). [**Trypanosomes transmitted by *Glossina morsitans* at Mutara, Ruanda**] *Ann. Soc. Belge de Méd. Trop.* 1958, Oct. 31, v. 38, No. 5, 965–70.

The English summary appended to the paper is as follows:—

"The important rôle of *Glossina morsitans* in transmitting the pathogenic trypanosomes of mammals has been established and confirmed at Mutara. A high concentration of cattle favours a high percentage of infection in the flies when compared with an area similar in all other respects.

"The percentages of infection by *T. brucei* and *T. congolense* are lowest at the end of the rainy season and highest at the end of the dry season. The indices of infection of trypanosomes belonging to the *T. brucei, T. congolense,* and *T. vivax* groups are given, as well as those for *T. grayi.* It is essential to start dissection immediately after the death of the Glossinae as laboratory experience has shown that trypanosomes rapidly disappear in flies killed by chloroform."

ROBERTSON, A. G. & BERNACCA, J. P. **Game Elimination as a Tsetse Control Measure in Uganda.** *East African Agric. J.* 1958, Apr., v. 23, No. 4, 254–61, 1 map.

This is an interesting and readable general report on the control of tsetse (*Glossina pallidipes* and *G. morsitans*) and cattle trypanosomiasis in Uganda mainly by game elimination since 1944. Both tsetse species had invaded large areas by the late 1930s. In the early 1940s about 8,000 square miles of cattle

country were already abandoned to fly, and the invasions continued. Progressively from 1944, intensive shooting of large game and encouragement of tribal hunts for pig and small game were organized to stem fly advances and, in particular, to reclaim the lost cattle country. The history of the progress of this reclamation in Central and North Central Uganda is outlined for the several districts involved, useful facts being given of the territory lost and regained, game destroyed and fly catches before and in the course of the campaigns. The interesting feature is the speed with which fly reduction and elimination was obtained. It is believed that a policy (instituted by J. Y. MOGGRIDGE) of shooting out game from tsetse concentration areas ahead of the main hunter line was important in effecting rapid eradication of fly from an area as a whole. To a very limited degree, bush clearing was done and some aerial spraying with DDT only in one restricted area. By 1957, complete reclamation of 4,800 square miles of valuable cattle country was obtained and good progress continues in a further 1,500 square miles. Game destroyed in fully reclaimed areas over the years amounted to 2,179 buffalo, 69 hippopotamus, 10 rhinoceros and 25,163 smaller animals of which 4,901 were bushbuck, a favoured host for *G. pallidipes*. Figures from tribal hunts are unknown. An increase of 800,000 cattle in the 10 years up to 1956 is attributed largely to the tsetse control which was achieved. Prevention of spread of Rhodesian sleeping sickness from a limited focus of transmission by *G. pallidipes* may also be credited to these control measures. The cost, including administration, transport, equipment and stores as well as wages and food worked out at about 2 shillings per acre. This contrasts favourably with 60 shillings or more for control of *G. pallidipes* by bush-felling. It is concluded that such low cost and great rapidity of success in extensive reclamation could not have been obtained by means other than game destruction.

Illustrated by a map, this article gives a vivid account of the nature of the original problem and threat to the cattle industry of Uganda and the remarkable successes which the Department of Tsetse Control has been able to secure in the past decade or so. *D. S. Bertram*

CANTRELL, W. **Cortisone and the Course of** *Trypanosoma equiperdum* **Infection in the Rat.** *J. Infect. Dis.* 1959, Jan.–Feb., v. 104, No. 1, 71–7, 1 fig. [12 refs.]

The course of *Trypanosoma equiperdum* infection in rats does not appear to be influenced by natural or acquired immunity and the outcome is invariably fatal. A search has been made during the course of the infection in this host for possible immunity by giving large doses of cortisone. It is recognized that in a number of infections this drug may have influenced immunity adversely, possibly by affecting phagocytosis. Adult rats were treated for 8–9 days with 100 mgm./kgm. cortisone acetate daily and on the last day were infected either intravenously or intraperitoneally with *T. equiperdum*; a further dose of drug was given on the following day to the rats infected intravenously.

The course of infection in treated and untreated rats was very similar, with slight delay in parasitaemia curve followed by delayed death in the treated animals, indicating some protection by cortisone. Loss of weight amounting to 20% also occurred after cortisone treatment. The results obtained suggest that immunity did not occur during the course of *T. equiperdum* infection, and slight

protection by cortisone may have been afforded as indicated by increased survival time in rats so treated. *J. D. Fulton*

WALTON, B. C., BAUMAN, P. M., DIAMOND, L. S. & HERMAN, C. M. **The Isolation and Identification of *Trypanosoma cruzi* from Raccoons in Maryland.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 603–10, 3 figs. [23 refs.]

The authors have isolated, from 5 out of 400 raccoons (*Procyon lotor*) in Maryland, a trypanosome indistinguishable from *Trypanosoma cruzi,* the characters of which are described in this paper. This trypanosome conforms to *T. cruzi* in the morphology of the blood forms and in the leishmanial stages of development in the cardiac muscles. It is infective to a number of mammals (mice, rats, opossums and monkeys) and readily grows in culture at 23°C. Like *T. cruzi,* the raccoon trypanosome develops in various triatomid bugs, the faeces of which were infective to the experimental animals. Cross-agglutination tests, carried out with cultures of this trypanosome, *T. cruzi* and *T. conorhini,* and rabbit antisera, confirmed the close antigenic relationship between the first two strains. In view of all these facts the raccoon trypanosome is identified as *T. cruzi.*

In considering the significance of these findings, the authors recall that previous records of *T. cruzi* from wild mammals (opossum, wood rat, armadillo, etc.) in the United States were from the south-western parts of the country (Georgia, Texas, New Mexico, Arizona and California), where only isolated cases of human infection were recorded [this *Bulletin,* 1956, v. 53, 421]. Although outside this area, Maryland is within the range of *Triatoma sanguisuga* and *T. lecticularius,* both of which are known vectors of Chagas's disease.

Illustrations are given of the trypanosomes in the blood and muscles of raccoons. *C. A. Hoare*

MCKEEVER, S., GORMAN, G. W. & NORMAN, Lois. **Occurrence of a *Trypanosoma cruzi*-Like Organism in some Mammals from Southwestern Georgia and Northwestern Florida.** *J. Parasitology.* 1958, Dec., v. 44, No. 6, 583–7. [11 refs.]

Up to the present *Trypanosoma cruzi* has been recorded from the following mammals in the United States: armadillo, opossum, pallid bat, house mouse, wood rat and raccoon. While studying the epidemiology of leptospirosis the authors detected the presence of this trypanosome in wild mammals of S.W. Georgia and N.W. Florida. In the course of a survey for leptospirosis in these areas, suspensions of ground kidneys and urine from 1,974 animals were inoculated in the Chang and the Fletcher media; the cultures were incubated at 28°C. and examined after 30 days by dark-field illumination. After trypanosomes were detected in such cultures, the blood of some animals was cultivated in Offutt medium as well.

T. cruzi was isolated by culture from 93 of 552 (17%) opossums (*Didelphys marsupialis*), 2 of 118 (1·7%) grey foxes (*Urocyon cinereoargenteus*), 9 of 608 (1·5%) raccoons (*Procyon lotor*) and 3 of 306 (1·0%) striped skunks (*Mephitis mephitis*). It was found that the percentage of infections revealed in opossums

by kidney culture was higher than that detected in blood cultures, while 2 infections were revealed in cultures of urine. Since in the areas examined Triatomid bugs (*Triatoma sanguisuga* and *T. lecticularius*) are scarce, but the incidence of infection is high, it is suggested that *T. cruzi* might be transmitted through contact with the urine of infected opossums. *C. A. Hoare*

Pinto, C. & Falcão, P. Eletroforese na doença de Chagas. [**Electrophoretic Patterns in Chagas's Disease**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, Aug., v. 15, No. 8, 536–9, 9 figs.

The English summary appended to the paper is as follows:—

"The authors made electrophoretic studies of serum proteins of seven patients with chronic Chagas disease. They found average low protein values and high alpha-2 and gamma globulins. The albumin globulin quotient was below normal in the majority of the patients. The electrophoretic patterns of chronic Chagas disease and of Kala-azar are different enough to warrant diagnostic clues."

Mauricio, J. V. Relação cardiopatia chagásica e megaesôfago. Estudo e observação de 40 casos em doentes de consultório a partir de Julho de 1954. [**Relation between Cardiopathy in Chagas's Disease and Mega-oesophagus. Study of 40 Cases since July 1954**] *Rev. Brasileira Med.* Rio de Janeiro. 1956, Feb., v. 13, No. 2, 103–4.

There were 12 cases of mega-oesophagus.

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Pyne, C. K. & Chakraborty, J. **Electron Microscopic Studies on the Basal Apparatus of the Flagellum in the Protozoon,** *Leishmania donovani*. *J. Protozoology*. Utica. 1958, Nov., v. 5, No. 4, 264–8, 7 figs. [19 refs.]

The authors describe the fine structure of the basal apparatus of the flagellum in the leptomonad stages of *Leishmania donovani* studied by electron microscopy. The cultured forms of this parasite were fixed in 1% osmic acid, buffered to *p*H 7·4 with acetate veronal for 30–60 minutes, after which they were embedded in a mixture of butyl and methyl methacrylate (4:1), and examined in thin sections.

The appearance of the structure in question was as follows. The flagellum is composed of a bundle of 10 pairs of central and peripheral fibrils which are enclosed in a sheath. At the point where the flagellum emerges from the body, the pellicle is invaginated and forms a vacuole around the base of the flagellum, which represents the so-called "basal granule" or kinetosome, the fibrils of

which sometimes terminate in the form of granular swellings. The kinetoplast represents an elongated body with transverse bands, enclosed in its own membrane, the whole organellum measuring 0·7 × 0·3 μ. The structure of the basal apparatus in *Leishmania* is compared with that of the ciliary and flagellar apparatus in other organisms (both protozoa and metazoa).

The structures described are illustrated in a series of electron micrographs.

C. A. Hoare

PARONIKYAN, G. M. **[Experimental Visceral Leishmaniasis in White Mice (Search for New Antileishmaniasis Drugs)]** *Med. Parasit. & Parasitic. Dis.* Moscow. 1959, v. 28, No. 1, 85–9. [In Russian.]

The English summary appended to the paper is as follows:—

"White mice are suitable for the reproduction of an experimental type of visceral leishmaniasis through intravenous introduction of Leishmania donovani.

"The intravenous infection of white mice with visceral leishmaniasis is positive in 95% of all cases. Subcutaneous and intramuscular administration of the infectious materials to the animals, as well as that into the liver shows positive results only within the range 6·5–20%.

"The minimum dose of the culture L. donovani which is still capable of reproducing experimental infection in white mice through intravenous introduction is between 15–30 thousand flagellates per mouse.

"The model of visceral leishmaniasis elaborated on white mice is suitable for screening drugs in vivo."

DEPIEDS, R., COLLOMB, H., MATHURIN, J. & RANQUE, J. L'intradermo-réaction à *Trypanosoma equiperdum* dans le Bouton d'Orient. **[Intradermal Reaction for Oriental Sore with *Trypanosoma equiperdum* Antigen]** *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 501–4.

The authors describe the results of intradermal tests, with antigen prepared from *Trypanosoma equiperdum*, in cases of human infection with *Leishmania tropica*.

The antigen is prepared as follows. Blood taken from infected guineapigs is collected in centrifuge tubes with 5% sodium citrate (1 and 2 parts respectively). The mixture is centrifuged at 2,000 r.p.m. for 5 minutes, the upper layer of fluid is discarded and the middle layer—containing the trypanosomes—is pipetted off, mixed with normal saline and centrifuged as before. After removal of the supernatant fluid the bottom layer is freed of the remaining erythrocytes by repeated centrifugation, leaving a suspension of trypanosomes. This is formolized (1:1,000), and the resulting antigen is preserved at −10°C.

The antigen was injected intradermally at the insertion of the deltoid in amounts sufficient to produce a papule measuring 5 mm. in diameter, together with a control injection of formol saline. The reaction was considered to be positive when it covered an area of 1 cm. in diameter and persisted beyond 48 hours. The test was carried out on 63 controls representing patients with various complaints, 4 patients suffering from cutaneous leishmaniasis and 2 with cutaneous lesions of uncertain origin. Positive reactions were obtained only in the group with oriental sore.

C. A. Hoare

Ranque, J., Depieds, R., Collomb, H., Mathurin, J. & Faure, A. L'intradermo-réaction à antigène *Trypanosoma equiperdum* dans certaines leishmanioses humaines et animales. [**Intradermal Reaction in Cases of Human and Animal Leishmaniasis with** *Trypanosoma equiperdum* **Antigen**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 504–6.

Antigen prepared from *Trypanosoma equiperdum* by the method described previously [see above] was used for intradermal tests in cases of human visceral leishmaniasis and in animals with natural and experimental leishmania infections. These comprised 9 patients (7 children and 2 adults) and 2 dogs suffering from Mediterranean kalaazar, as well as hamsters with visceral infections produced by *Leishmania infantum* and *L. tropica*. In all these cases the reaction was negative.

From these and previous [*loc. cit.*] experiments it is seen that the intradermal test with trypanosome antigen reacts positively in cases of leishmaniasis in which the skin is involved, but not in generalized infections. *C. A. Hoare*

Reyes G., G. Algunos aspectos de la leishmania observados en el Hospital de San Juan de Dios de Bogotá. [**Observations on Leishmaniasis seen in the San Juan de Dios Hospital in Bogotá, Colombia**] *Rev. Facul. de Med.* Bogotá. 1957, Sept.–Oct.–Nov.–Dec., v. 25, Nos. 9, 10, 11 & 12, 371–91, 16 figs. [12 refs.]

Both cutaneous and mucocutaneous leishmaniasis exist in Colombia and the author (who has studied the disease for 25 years) gives a short account of the history and geographical distribution of these conditions in the country. Cases are chiefly found in the neighbourhood of the large rivers, at an altitude of between 1,000 and 1,200 metres, and with a temperature of 20°–28°C.; people of all ages are affected but males predominantly. Apart from the usual clinical manifestations, the cutaneous form may be severe and chronic with lymphatic involvement, verrucose lesions or granulomatous masses; biopsy of the affected tissues will often provide a clue to the correct diagnosis, while the Montenegro reaction is positive in 100% of the cases. The mucocutaneous type occurs more frequently in Colombia than the cutaneous, and may arise from 6 months to 20 years after the appearance of the initial lesion; the usual lesions are found, including destruction of the nose, invasion of the pharynx and palate with the disappearance of the uvula, loss of voice, etc., and these are followed by pulmonary complications and death.

Local treatment of the lesions is rarely effective; the classical therapy with tartar emetic every 2 to 4 days in 20 injections is satisfactory—modern substitutes are not usually as good except for Glucantine; fever therapy (by intravenous injections of TAB vaccine) is helpful as an adjunct to the former. The mucocutaneous disease is, however, difficult to cure and relapses are frequent.

In the past 16 years in the Bogotá hospital, 369 cases of cutaneous and 171 cases of mucocutaneous leishmanias were treated in males; 150 and 35 respectively in females. *P. C. C. Garnham*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

LUTYNSKI, R. Charakterystyka epidemiologiczna duru wysypkowego epidemicznego i sporadycznego w województwie krakowskim w latach 1950–1955. [**The Epidemiological Features of Epidemic and Sporadic Typhus Fever in the Province of Kraków in 1950–1955**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 2, 157–63, 2 figs. [10 refs.] English summary.

During the first 6 years after the end of the last war a number of fairly large epidemics of typhus occurred in the province of Kraków, Poland, affecting mostly persons living in poor hygienic conditions, particularly gypsies. The annual incidence declined rapidly during the period, and in 1950 a change in epidemiological character occurred, in that 40% of the recorded cases were sporadic and unconnected with epidemic outbreaks. In 1951 the incidence reached a minimum, with 9 cases, 6 of which were sporadic; the annual number of cases then rose slowly to reach 31 in 1955. Between 1950 and 1955 115 cases were recorded, 89 (77·4%) of which were sporadic and 5 of which were laboratory infections. The sporadic cases were evenly distributed over the year and did not show the winter–spring seasonal incidence characteristic of epidemic typhus.

Consideration of the past histories of the patients showed that 36·3% of the sporadic cases were undoubted relapses and 18·1% were probable relapses. In 19·1% of sporadic cases the possibility of relapse could be excluded. Sporadic cases mostly occurred in epidemiologically favourable situations (absence of lousiness, good hygienic conditions), although they gave rise to limited epidemics in 3 instances. The primary infection had usually occurred during the first world war (22 cases, 55%) or during the second (13 cases, 33%); no relapses were observed in patients aged up to 19 years. *D. J. Bauer*

PASTUKHOVA, G. M. **The Epidemiological Characteristics of Primary and Recurrent Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 9/10, 1307–10. [Translated from Russian.]

The persistence of endemic typhus has been attributed by some to the occurrence of relapses. The author of this paper contends that primary and relapse cases should be easily differentiated epidemiologically. He investigated the sources of infection in diagnosed cases by carrying out complement fixation with *Rickettsia prowazeki* on all suspected persons in the patient's environment. Details are given of a number of his patients who were infected from unrecognized primary or recurrent cases. Infections of children, which are mild, and recurrent cases, are difficult to diagnose except by serological methods. Often the patient gave a history of a railway journey, an occupation connected with dirty linen or clothes or involving frequently changing contact with people, or discovery of louse infestation during the incubation period.

He concludes that since primary and recurrent cases occurred under similar circumstances it may be inferred that reinfection rather than relapse is usually

the cause of recurrence of typhus. He emphasizes the value of complement deviation in epidemiological studies, and the difficulty of tracing the source of infection under urban industrial conditions in which there is frequently changing contact with large numbers of people. *T. H. Davey*

Zivkovic, B. & Simic, M. Kretanje nivoa komplement-fiksirajucih antitela kod osoba koje su prebolele pegavac u vremenu od 1946 do 1957 god. [**Fluctuations in the Level of Complement-Fixing Antibodies in Persons who had suffered from Typhus in the Period from 1946 to 1957**] *Higijena.* Belgrade. 1958, v. 10, No. 3, 169–87, 6 figs. [23 refs.] English summary.

An investigation has been made of the titre of complement-fixing antibody to *Rickettsia prowazeki* at various times up to 12 years after infection in 733 persons who had suffered from typhus in an endemic focus of infection in Yugoslavia. A titre of 8 or higher appeared on the 4th day of illness and was present in all persons examined by the 19th day. The incidence of antibody remained at 100% until the 6th month, and then fell gradually until the 4th year, remaining at about 80% for at least 12 years, when titres as high as 512 were observed in 2 of 61 persons (3·3%). Considerable fluctuations in the titre were frequently observed in serial examinations of persons who had had typhus several years previously. A brief account is given of 2 epidemics of typhus with no obvious source of infection which occurred in a gypsy community in the same month in 2 successive years. It is suggested that the persistence of complement-fixing antibodies for prolonged periods is due to the existence of a carrier state, which may become activated into relapses of the disease, giving rise to epidemic outbreaks. *D. J. Bauer*

Weiss, E., Dressler, H. R. & Suitor, E. C., Jr. **Further Studies of Drug-Resistant Strains of** *Rickettsia prowazekii*. *J. Bacteriology*. 1959, Jan., v. 77, No. 1, 91–100, 6 figs.

This paper describes the selection of strains of *Rickettsia prowazeki* (Madrid E) which were resistant to *p*-aminobenzoic acid (PAB^{rr}), 2,3-dimethylquinoxaline-1,4-dioxide (Q^r) and a combination of these compounds ($PAB^{rr}Q^r$).

The 3 strains were obtained by serial passage in eggs containing amounts of the compounds which inhibited the parent strain. In the case of PAB^{rr}, the parent strain was one which had already been selected for resistance to 3 mgm. of *p*-aminobenzoic acid per egg; resistance to 10 mgm. per egg occurred between the 14th and 16th passage, a limit dilution isolation being made at the 21st passage. Q^r was obtained by limit dilution isolation after passing the parent strain (which was appreciably inhibited by 0·1 mgm. of the quinoxaline compound per egg) 20 times in the presence of increasing amounts of compound, when resistance to 0·5 mgm. per egg was demonstrable. $PAB^{rr}Q^r$ was derived from a mixture of PAB^{rr} and Q^r rickettsiae after 2 passages in the presence of 5 mgm. of *p*-aminobenzoic acid and 0·5 mgm. of the quinoxaline compound per egg; genetic transfer seemed to be a likely explanation.

The drug-resistant strains resembled the parent strain in respect of mouse toxicity, haemolysin production and antigenicity (complement-fixing antibody response in the guineapig); Q^r showed reduced virulence for the chick embryo

and PAB^{rr}Q^{r} was markedly less virulent and infective for chick embryos and cotton rats. These studies may help in the analysis of genetic events in rickettsiae.

[For a previous study by the authors, see this *Bulletin,* 1957, v. 54, 940.]

R. S. F. Hennessey

Balaeva, N. M. **The Biological Properties of *Rickettsia mooseri* after Prolonged Cultivation in the Intestine of the Body Louse. III. The Morphology of *Rickettsia mooseri* and *R. prowazeki* studied by means of the Electron Microscope.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 7, 1147–8. [Translated from Russian.]

Cohn, Z. A., Bozeman, F. Marilyn, Campbell, Janis M., Humphries, J. W. & Sawyer, T. K. **Study on Growth of Rickettsiae. V. Penetration of *Rickettsia tsutsugamushi* into Mammalian Cells *in vitro*.** *J. Exper. Med.* 1959, Mar. 1, v. 109, No. 3, 271–92, 4 figs. [26 refs.]

"A system has been described in which the penetration of *Rickettsia tsutsugamushi* (Karp strain) into tissue culture cells can be quantitated, and the factors affecting this process studied. The results indicated that rickettsial penetration *in vitro* depended largely on the viability of the organisms. Certain components of the fluid environment such as the divalent cations and protein were found to be of importance. The temperature dependence of the penetration process was found to vary with the nature of the suspending medium. A number of compounds related to L-glutamic acid enhanced penetration, whereas metabolic inhibitors depressed this process. Aureomycin at concentrations between 50 and 250 μg./ml. inhibited the penetration of rickettsiae while chloramphenicol at similar concentrations was ineffective. The results are discussed in terms of the biological and biochemical properties of this group of agents."

Zdrodovskii, P. F. & Golinevich, E. M. **Differentiation of the Causative Organism of East African Tick-Borne Rickettsiosis (Kenya Tick Typhus) and Indian Tick-Borne Rickettsiosis (Indian Tick Typhus).** *Problems of Virology.* London. 1958, v. 3, No. 4, 219–23. [Translated from Russian.]

Chick embryos 6 days old inoculated with Kenya tick typhus died on the 4th to 5th day after infection showing haemorrhagic lesions. Guineapigs inoculated from the yolk sac of infected chick embryos developed pyrexia 2 to 3 days after inoculation. Smears from the yolk sac showed rickettsiae. Pyrexia in the infected guineapigs lasted 3 to 11 days and was accompanied by marked scrotal symptoms. Smears from the surface of the tunica vaginalis showed rickettsiae. Animals which survived were insusceptible to infection with the Black Sea strain of *Dermacentroxenus* [*Rickettsia*] *conori*. Serological studies carried out with antigens from chick embryos showed that Kenya tick typhus antigen is identical with the antigen from *D. conori*. Similar experiments carried out with a strain of Indian tick typhus confirmed the opinion of Philip [this *Bulletin,* 1952, v. 49, 765] that it is identical with *D. conori*.

The cytological, cultural and immunological investigations showed that the Kenya tick typhus strain is a type strain of *D. conori*; in other words Kenya tick typhus is identical with Marseilles fever. *P. A. Clearkin*

KOSOBUTSKII, L. A. & TIMOFEEVA, M. M. **Q Fever in Belorussia.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1262–4. [Translated from Russian.]

LASHKEVICH, V. A. **An Outbreak of Q Fever in a Sewing-Shop due to the Use of Dusty Cotton-Wool.** *Problems of Virology.* London. 1958, v. 3, No. 4, 244–6. [Translated from Russian.]

LUOTO, L. **The Epidemiology of Q Fever in the United States.** *Amer. J. Pub. Health.* 1959, Mar., v. 49, No. 3, 334–8. [32 refs.]

A general review and discussion.

BLINOV, P. N. **The Distribution of *Rickettsia burneti* in Nature.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1268–71. [10 refs.] [Translated from Russian.]

"(1) In active foci of Q fever the causative agent of the disease may be widely disseminated as a result of being excreted by infected ticks and other wild parasites as well as by domestic animals.

"(2) Cattle infected with Q fever may excrete *R. burneti* into the external environment in milk, nasal mucus and faeces. The presence of rickettsias in the faeces of cattle can be detected 70–90 days (period of observation) after Q fever has been diagnosed.

"(3) The high rate of survival of rickettsias in the external environment, particularly in dung, in the dust of pastures and in water, has been confirmed.

"(4) The findings show that in the foci of Q fever animals and man can become infected by respiratory and alimentary routes."

ROBERTS, Audrey N. & DOWNS, Cora M. **Study on the Growth of *Coxiella burnetii* in the L Strain Mouse Fibroblast and the Chick Fibroblast.** *J. Bacteriology.* 1959, Feb., v. 77, No. 2, 194–204, 5 figs. [19 refs.]

"The L strain mouse fibroblast and chick fibroblast were shown to be susceptible to infection with *Coxiella burnetii*. Intracellular rickettsiae were first observed 72 hr after initial contact, appearing in well-defined cytoplasmic vacuoles in the L cells.

"No rickettsial multiplication was shown in cell-free Eagle's medium or in L cell debris. Multiplication of *C. burnetii* in L cells was demonstrated by the 3 log increase in egg LD_{50} which occurred between 2 and 72 hr incubation. It was also shown that the rickettsiae could invade and infect the mouse fibroblasts within a 30-min contact period.

" A concentration of 0·5 mg per ml of streptomycin prevented both rickettsial penetration into the L cells and cell to cell spread, whereas a concentration of 0·1 mg per ml was only slightly inhibitive.

" A titration of the 20 per cent purified yolk sac suspension on cover slip cultures of L cells revealed that a 10^{-12} dilution produced visible infection after 72 hr incubation. Cell to cell spread of rickettsiae was demonstrated by the increased percentage of cells infected over a 9-day incubation period.

" Heavily infected L cells and chick fibroblasts were successfully transferred from one glass surface to another.

" *C. burnetii* has been maintained through 12 transfers in the L cells to date, with no apparent decrease occurring in the number of rickettsiae produced per bottle of cells.

" Fluorescent antibody studies revealed the presence of intracellular rickettsiae only 21 hr after initial invasion. No intranuclear infection was noted."

KORDOVÁ, N. **Filterable Particles of *Coxiella burneti*.** *Acta Virologica.* Prague. 1959, Jan., v. 3, No. 1, 25–36, 1 text fig. & 8 figs. on 2 pls. [19 refs.]

The observation of minute particles in tissue cultures infected with *Rickettsia burneti* led the author to undertake ultrafiltration experiments to determine whether these particles were capable of developing into typical rickettsiae.

Suspensions of yolk sac infected 7 days previously with the Henzerling and Nine Mile strains were filtered through collodion membranes with mean porosities ranging from 132 to 65 mμ and the filtrates inoculated into eggs, guineapigs, hamsters, mice and tissue cultures. Typical forms of *R. burneti* were found after 3 or 4 yolk sac passages from eggs inoculated with filtrates from membranes down to 65 mμ mean porosity, the infective agent being present in the filtrates in titres greater than 1 in 10^{10}. Guineapigs which received the filtrates developed specific complement-fixing antibodies; hamsters developed no antibodies within 30 days, but inoculation of their spleen material into guineapigs led to the development of antibodies by the latter. Typical forms of *R. burneti* were found in chick embryo yolk sac tissue cultures 16–18 days after inoculation of filtrates.

These results indicate that yolk sacs infected with *R. burneti* 7 days previously contain particles which are able to pass through filters of 65 mμ mean porosity and to give rise to morphologically typical *R. burneti* on passage in yolk sacs, animals or tissue cultures. It is thought that particles seen microscopically in infected material may represent stages in " maturation " of the organism.

R. S. F. Hennessey

MORELJ, M. & GERBEC, M. **Immunological Analysis of some Strains of *Coxiella burneti*.** *Acta Virologica.* Prague. 1959, Jan., v. 3, No. 1, 37–45, 5 figs. [18 refs.]

The results of this study of 7 strains of *Rickettsia burneti* accord with previous conclusions [this *Bulletin*, 1956, v. 53, 573] that newly-isolated strains (phase I) are relatively insensitive in the complement-fixation test with early convalescent sera, giving higher titres with late convalescent sera. With

increasing numbers of chick embryo passages the strains become more sensitive (phase II), giving high serum and antigen titres with both early and late convalescent sera. *R. S. F. Hennessey*

Sokolova, N. F. & Fedorova, N. I. **A Further Study of the Resistance of *Rickettsia burneti* to the Action of Certain Chemical Substances.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1264–7. [Translated from Russian.]

"(1) *Rickettsia burneti* possesses relatively high resistance to the action of chemical substances: it does not die after action for 15 min of a solution of formalin containing 1% formaldehyde, a 5% solution of acetic acid, or after action for 5 min of a 5% solution of sodium hydroxide and a 3% solution of hydrogen peroxide.

"(2) A solution of formalin containing 2% formaldehyde, a 10% solution of sodium hydroxide, and a 5% solution of hydrogen peroxide have a lethal effect on *R. burneti* in 5 min."

Kulagin, S. M., Sokolova, N. F. & Fedorova, N. I. **A Study of the Disinfection of Surfaces infected with the Causative Agent of Q Fever.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1271–5. [Translated from Russian.]

Rickettsia burneti in the form of egg culture material was shown to survive on glass and other surfaces for up to 15 days. Wood and linoleum surfaces so contaminated were sprayed with disinfectants and scraped or swabbed 15 or 30 minutes later, the material so obtained being cultivated in the chick embryo. 5% phenol sterilized linoleum but not wood, 3% chloramine and 3% "KhB" (not defined) are apparently considered to have given satisfactory results on both surfaces, but the table of results shows one "+" sign for each of them, and nothing is said about how many times the tests were done.

L. P. Garrod

Kulagin, S. M., Sokolova, N. F., Subbotin, A. A. & Silich, V. A. **The Study of Disinfection of Underclothes, Overalls and Articles in Cases of Q Fever.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1275–9. [Translated from Russian.]

Rickettsia burneti dried on pieces of fabric survived for 40 days: standard pieces of such contaminated fabric were used in the following tests, being included with clothing submitted to disinfection procedures, and subsequently shaken in saline, with which chick embryos were then inoculated.

Boiling for 30 minutes in soap and soda solution (no details given) destroyed the organism, as did soaking for 1 hour in 5% phenol, 3% chloramine, 3% "KhB". Some experiments were also done with a mixture of steam and air, from which it appears that a temperature of about 90°C. for 45 minutes is necessary by this method [that part of the text which apparently refers to the proportion of steam to air is obscure, perhaps owing to mis-translation]. A series of tests was also done in a formalin disinfector which suggest that the concentration of formalin required is high. *L. P. Garrod*

PIRSCH, J. B.; MIKA, L. A.; POLLOK, N. L. **Studies on Mixed Infections. IV. Role of Bacterial Endotoxin in Combined Infection with *Brucella suis* and *Coxiella burnetii*** [PIRSCH & MIKA]. *J. Bacteriology*. 1959, Feb., v. 77, No. 2, 185–8. [12 refs.] **V. Effect of Stressor Compounds in Combined Infection with *Brucella suis* and *Coxiella burnetii*** [MIKA, PIRSCH & POLLOK]. *Ibid.*, 189–93. [10 refs.]

IV. The ability of an active *Brucella suis* infection to interfere with the course of a superimposed *Rickettsia burneti* infection in the guineapig seemed attributable to one or more bacterial components, and experiments undertaken to test this assumption are described. Injections of preparations of *Br. suis* which had been subjected to ultraviolet irradiation, or which had been irradiated and treated sonically, did not affect the course of a subsequent rickettsial infection, but injections of *Br. suis* endotoxin (mouse LD50 (intraperitoneal) 0·5 mgm.) did so. Thus, 7 out of 10 guineapigs which received 100 μgm. of endotoxin subcutaneously on the 5th and 2nd day before infection with *R. burneti* (10^8 guineapig ID50), on the day of infection, and on the 2nd, 4th, 7th and 10th days thereafter, survived the rickettsial infection, compared with 2 out of 10 control animals. No interference was observed when treatment with endotoxin was started on the day of infection with *R. burneti*, or when endotoxin was given intracardially instead of subcutaneously.

Guineapigs treated with lipopolysaccharides extracted from *Salmonella typhi* or *Escherichia coli* showed no increase in resistance to *R. burneti* infection, and it is suggested that the ability to cause such interference may be a specific attribute of *Brucella* endotoxin.

V. The increased resistance to *R. burneti* infection shown by guineapigs infected with *Br. suis* was not affected by treating the animals with urethane, camphor, or thyroid extract, but treatment with thyroid extract when the rickettsial infection was established produced 100% mortality by the 10th day. Treatment with cortisone appeared to nullify the interference phenomenon, the inflammatory response to the primary *Br. suis* infection being significantly depressed.

[See also this *Bulletin*, 1959, v. 56, 293.] *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

SCHULZ, K. H. **Yellow Fever and the Receptive Area of the Witwatersrand.** *Med. Proc.* Johannesburg. 1959, Jan. 24, v. 5, No. 2, 37–42. [21 refs.]

In the Union of South Africa immunity tests for yellow fever have revealed protected persons but no human cases have been reported and all monkeys examined have proved negative. Labour for the mines is recruited mainly outside the endemic zone but some comes from it and the transport routes pass through it. If the virus were introduced in man or mosquito an outbreak

could occur in the concentrated non-immune population of the Witwatersrand since suitable vectors (*Aëdes aegypti* and *A. metallicus*) are present. Surveys show *Stegomyia* to be scanty and adversely affected by the severe climatic changes. Breeding is in tanks, drains and ponds around houses and not in small containers, leaf axils or tree holes. Watercourses and dams contaminated by rainwater running off gold-mine sand-dumps and slimes dams proved highly acid and free from aquatic life including mosquitoes, while tanks and water collections little contaminated by sand approached neutrality and supported mosquito breeding. If yellow fever were introduced into the Witwatersrand species sanitation would be feasible and economical. The main control measures to be adopted are outlined. *T. H. Davey*

PANTHIER, R., BRES, P., HUSSON, R. A. & HANNOUN, C. Étude des anticorps sériques provoqués par la vaccination antiamarile. [**Study of the Serum Antibodies evoked by Yellow Fever Vaccination**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 589–600.

When, by reason of a person's allergy to the tissue juices of chick embryo, initial yellow fever immunization cannot be carried out otherwise than intradermally with 17D vaccine, it has been the practice at the Pasteur Institute, Paris, since 1953, to administer there a single intradermal injection of 0·1 ml. of that vaccine and to advise revaccination abroad one or two months afterwards with Dakar vaccine by scarification. To compare the effectiveness of this procedure with that of the two immunizing methods commonly in use was the object of the present study, in which the degree of protection conferred was estimated by the antibody content of the sera examined. In order to compare the quantities of antibodies contained in the different sera, it was necessary to define a unit, which would express in figures the differences between the protective powers of these sera. This unit of protection was defined by the authors as a dilution (in normal serum) of hyperimmune serum which, after contact, first for 20 minutes at 20°C. and then for 1 hour at 37°C., with an equal volume of a dilution of virus—the serum-virus mixture containing originally 100 mouse LD50 per 0·03 ml.—neutralizes, as evidenced by the intracerebral mouse protection test, 99% of the virus, *i.e.*, 50% of the mice survive the inoculation. Results were calculated by the Sven Gard method (I/T) on the basis of the time elapsing before the development of paralysis and the death of the mice. Comparison of the neutralization curves established for the sera under test, after serum-virus contact for 20 minutes at 20°C. and for 1 hour at 37°C., respectively, with the control neutralization curves previously obtained from progressive dilutions of hyperimmune serum and the same suspensions of virus as those used in the test, permit measurement in the test sera of the respective quantities of total antibodies and of antibodies non-dissociable from the antigen-antibody complex. In these tests the virus suspensions were prepared from the Dakar strain and were stored undried at −60°C.

Sera for examination were collected from 40 airmen without previous history of allergy. All had received intradermally 0·1 ml. of 17D vaccine and 3 weeks later they had been revaccinated by scarification with Dakar vaccine. The initial injection of 17D vaccine provoked no reaction, but following the administration of Dakar vaccine, 3 of the airmen developed intense headache, one on the 18th day and 2 on the 20th day. Blood samples were collected:

from all 40 just before revaccination (group I), from the same number 4–5 weeks after revaccination (group II) and from the 10, then available, 6 months after revaccination (group III). The neutralizing power of the various sera, expressed in units of protection, proved to be as follows: in group I (3 weeks after the intradermal injection of 17D vaccine), the average quantity of total antibody was 1·5, that of non-dissociable antibody 0·4; in group II (4–5 weeks after revaccination with Dakar vaccine), while a certain lowering of neutralizing power after serum-virus contact for 20 minutes at 20°C. was reflected in the average total antibody dropping to 1·3, the non-dissociable antibody had risen to 0·7; and in group III (6 months after revaccination with Dakar vaccine), the total antibody had increased to 2·8 and the non-dissociable to 1·05.

Subcutaneous inoculation of 0·5 ml. of 17D vaccine 3 weeks previously resulted in widely varying antibody response in different people, the serum containing from 1 to 10 units, and, on the average, from 3 to 4. Six months after vaccination saw a slight increase in total antibody and a proportionately greater increase in non-dissociable antibody. In cases where a post-vaccinal reaction occurred there was a virtual absence of dissociable, imperfect antibody. In persons vaccinated 3 weeks previously with Dakar vaccine by scarification, a similar divergence in individual antibody response was observed, but the total antibody content was, on the average, much higher; it was always more than 5 units and sometimes it attained 30 units. In persons experiencing post-vaccinal reactions of some intensity, serum antibody was almost wholly of the non-dissociable type.

From the authors' study it emerges that antibody response to the intradermal inoculation of 17D vaccine (0·1 ml.) may be regarded as, on the average, one-half that to the subcutaneous inoculation of 17D vaccine and about one-tenth that to scarification with Dakar vaccine; and that, while after any method of vaccination a fairly constant proportion of the antibodies evoked in persons without post-vaccinal reaction is of the dissociable type, only in those with severe reactions, due to the immunizing virus, does the serum simulate experimental hyperimmune serum by containing almost exclusively antibody of the non-dissociable type.

Finally it is of interest to observe that in the case of a person who had been vaccinated 10 years previously with 17D vaccine and who, after that time, still had demonstrable antibody in his serum, the intradermal injection of 0·1 ml. of 17D vaccine evoked a remarkable rise in the level of antibody to more than 20 units. *G. Stuart*

COLLIER, W. A., DE ROEVER-BONNET, H. & HOEKSTRA. J. **Some Data on the Immunity of Mice to Yellow Fever Virus.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 261–71. [11 refs.]

Mice immunized with 1 or more inoculations of 17D yellow fever virus intraperitoneally were significantly protected against intracerebral challenge with the same virus but not against intracerebral neurotropic Asibi yellow fever virus. Intraperitoneal immunization with Asibi virus protected mice against both viruses given intracerebrally. Mice surviving from titrations of 17D virus by the intracerebral route showed protection against intracerebral challenge by both viruses. Nearly all mice receiving an infective dose of Asibi virus intracerebrally died so that comparable experiments on intracerebral immunization

by Asibi virus were difficult. [The implication is that the infectivity of 17D virus as evidenced by its immunizing power after intracerebral inoculation markedly exceeds its infectivity judged by fatal encephalitis in mice.]

C. E. Gordon Smith

RABIES

PITZSCHKE, H. Erfahrungen mit dem Sellers-Quetschpräparat und dem Mäuse-Tierversuch bei der Laboratoriums-Diagnose der Tollwut. [**Experiences with the Sellers Crush Preparation and Mouse Inoculation in the Laboratory Diagnosis of Rabies**] *Zent. f. Bakt.* I. Abt. Orig. 1958, v. 172, Nos. 3/4, 197–211, 1 fig. [53 refs.]

During the course of 5 years the author has carried out 9,820 examinations for the diagnosis of rabies, of which 1,794 gave positive results. In 865 cases, 115 of which were positive, examination of paraffin sections of tissue from the cornu ammonis and of smears of the same material stained by the Sellers method [this *Bulletin,* 1954, v. 51, 1242] gave equally reliable results, and in a further 65 positive cases examination of tissue from only 1 side was sufficient to establish the diagnosis. In mouse inoculation experiments rabies virus was demonstrated in the urine of 1 of 7 foxes naturally infected with the virus.

D. J. Bauer

NOURY, M. & CHEVRIER, L. Sur le diagnostic expérimental de la rage. [**The Experimental Diagnosis of Rabies**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 477–9.

Experimental confirmation of clinical rabies in man may, on occasion, be rendered unduly time-consuming by reason of the tardy and inconstant occurrence of Negri body formation in the brains of laboratory animals used in the investigation. Details of a human case of rabies, and of an investigation, which, for the above reason, was greatly protracted before definite diagnosis could be established, are given in the present paper.

On 8th May 1957 a 2½-year-old Moroccan girl, who, 4 days previously, had been bitten superficially on the right thigh and buttock by an apparently healthy 2-month-old puppy, began anti-rabies treatment at the Pasteur Institute, Casablanca. As, however, histological examination of the puppy's brain, which had been removed just after the time of biting, failed to reveal the presence of Negri bodies, treatment was discontinued on 17th May, after only 7 injections of phenolized vaccine had been given in the 9-day period. Treatment was discontinued against the Institute's advice, but on the decision of the child's father, who had become aware of the laboratory finding. On 14th June—40 days after the biting and 28 days after the last injection—the child died of acute encephalitis, on the day of her admission to hospital and 3 days after the onset of illness. Permission for autopsy having been obtained, brain specimens (a cerebral hemisphere in formol-alcohol and a fragment of the bulb in glycerol) were sent for laboratory investigation.

Inasmuch as histological examination failed to reveal the presence of Negri bodies in any part of the child's brain, animal inoculation was carried out. On 19th June an emulsion of the bulb was inoculated intracerebrally into one rabbit (no. 1), and 0·5 ml. of the same emulsion was injected intramuscularly into the thigh of another rabbit (no. 2). Rabbit no. 1 died 20 days later, with ill-defined signs of paralysis on one side of the head; no Negri bodies were found in its Ammon's horn. Rabbit no. 2 died, after 3 days of typical paralytic signs, on 15th March 1958, *i.e.*, 270 days after the intramuscular injection; as in this case histological examination revealed the presence of numerous Negri bodies in Ammon's horn, a diagnosis of rabies was finally established. Whether the virus had been modified by this prolonged period of incubation was then investigated by the inoculation, intramuscularly in the nape of the neck, of 2 other rabbits (nos. 3 and 4) with 0·25 ml. of an emulsion of the bulbs from rabbit no. 2. Rabbit no. 3 died, with signs of paraplegia, 20 days after the inoculation, and Negri bodies were found in its Ammon's horn. Rabbit no. 4 died, paralysed, 21 days after inoculation, but in this case no Negri bodies were demonstrable in its brain.

The above example of prolonged incubation in a passage rabbit affords experimental proof of the latency of the virus, remaining, as it did, localized for 270 days, but without modification of its pathogenic power. *G. Stuart*

VEERARAGHAVAN, N. **Improvement of the Antigenicity of Antirabies Vaccine by pooling checked by Post-Challenge Vaccination of Guinea-Pigs.** *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 1, 121–31, 2 figs.

Having found considerable variation in antigenicity among batches of anti-rabies vaccine (5% Semple type), prepared under identical conditions from different sheep brains at the Pasteur Institute of Southern India, Coonoor, the author carried out a number of experiments there, with the object of developing a vaccine of uniform potency. As a result of this experimentation it emerged that a vaccine of reasonably uniform potency could be obtained, when 12 batches of vaccine prepared from 12 infected sheep brains were pooled before being distributed into ampoules. Pooling was at first effected by pipetting out and mixing equal quantities (not less than 50 ml.) of vaccine from each batch, but later, when results with the pooled vaccine proved to be satisfactory, by pouring each batch from a Winchester quart bottle into a specially-devised mixing machine, in which the contents were stirred continuously by rotation of the agitator blades. The antigenicity of the pooled vaccine was determined in mice, the rabies reference vaccine 155-D being used as the standard of comparison. To this end the 50% effective dose (ED50) was calculated [as the amount, in mgm., of brain tissue protecting 50% of the mice against a subsequent challenge with rabies virus (standard challenge virus-CVS)]. In this connexion it should be noted that in the antigenicity tests the ED50 of the reference vaccine fell below 10 mgm. only when the challenge dose was about 5 LD50, and that with challenge doses of 10 LD50 or more there was a disproportionate rise in the ED50—high values probably due, in part, to slight deterioration in the antigenicity of the vaccine.

Results obtained from (a) antigenicity tests and from (b) the post-infection treatment of guineapigs with pooled vaccine against different strains of street virus are presented. (a) Tests carried out on individual batches and on pools

prepared from 50 ml. of each batch showed that: in one experiment, in which the CVS dose was 5 LD50, the ED50 of one batch exceeded 25 mgm., while that of 2 other batches was 3·9 and 5 mgm., respectively, compared with a value of 5 mgm. for the reference vaccine and one of 2·6 mgm. for the pooled vaccine; and in a second experiment, in which the CVS dose was 3 LD50, the ED50's of 2 batches were 3·4 and 5 mgm., respectively, compared with 3·8 mgm. for the reference vaccine and with values of 1·8 and 1·0 mgm., respectively, for 2 pooled vaccines. Tests carried out on individual batches and on pools prepared in the mixer showed that: in one experiment, in which the CVS dose was 21 LD50, the ED50 value of each of 3 individual batches, as well as that of the reference vaccine, exceeded 25 mgm., while that of the pool was only 6·4 mgm.; and that in a second experiment, in which the CVS dose was 10 LD50, the ED50 value of 3 individual batches was, respectively, 11·2, 5 and 11·2 mgm., while that of the pool was 5 mgm. and that of the reference vaccine over 50 mgm. From these results it will be seen that, while there was considerable variation in the antigenicity of the individual batches, the antigenicity of the pooled vaccine did not vary greatly from one pool to another and was, on the whole, appreciably greater than that of either the individual batches or the reference vaccine. (b) The challenge viruses used in the tests to determine the immunizing potency of pooled vaccine were the lyophilized canine submaxillary gland suspensions of the NYC and Marimuthu strains and the lyophilized submaxillary gland material from a jackal (J.154), which had died of natural rabies infection. Vaccine treatment in all cases was begun 1 hour after challenge. Results showed that excellent protection against 8 LD50 of the NYC strain and 9 LD50 of the Marimuthu strain was afforded by treatment with 14 doses of 0·075 ml. or 0·15 ml. of pooled vaccine, the mortalities being 1 out of 10 and 2 out of 10, respectively. Statistically significant protection was also obtained with 14× 0·15 ml. against 38 LD50 of the Marimuthu strain (mortality 6 out of 10), with 14× 0·075 ml. against 42 LD50 of the J.154 strain (mortality 10 out of 20), and with 14× 0·15 ml. against 46, 101 and 105 LD50 of the latter strain (mortalities being 13 out of 20, 18 out of 25 and 11 out of 25, respectively).

A significant protection with pooled vaccine administered, after experimental infection, in doses corresponding to those used in the treatment of man, was, therefore, demonstrable. *G. Stuart*

Davis, D. E. & Wood, J. E. **Ecology of Foxes and Rabies Control.** *Pub. Health Rep.* Wash. 1959, Feb., v. 74, No. 2, 115–18, 1 chart.

"In summarizing the data on fox populations applicable to the prevention of rabies, these points deserve emphasis.

"Because of high birth and death rates, fox populations are essentially an annual crop. Thus, there are many new, susceptible foxes each year, and increase in numbers, even after a reduction, may be rapid.

"Examination of prevalence of rabies virus in foxes or of abundance of foxes when conducted on the small scale that seems feasible is not sufficiently sensitive for predicting rabies outbreaks. Thus, the reporting of human and animal cases is still the best method of warning that preventive measures are desirable.

" Trapping foxes will reduce their numbers, but the effect of such reductions on prevalence of rabies in the fox populations is yet to be determined. The agricultural trend in the southeastern United States from small farms to large tracts of timber or pasture should reduce fox numbers and consequently the amount of rabies."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

MIRONOV, N. P. **The Past Existence of Natural Foci of Plague in the Steppes of Southern Europe.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1193–8. [16 refs.] [Translated from Russian.]

LEMOS, F. C. Notícias sôbre a epidemia de peste em Santos (1899). [**Notes on the Plague Epidemic in Santos, Brazil, in 1899**] *Rev. Inst. Adolfo Lutz.* S. Paulo. 1957, v. 17, 71–150.

KOROBKOVA, E. I. **Action of Glycine on *Pasteurella pestis*—III. The Nature of Plague Toxin and its Importance in Active Immunization.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 11/12, 1662–7. [Translated from Russian.]

Culture of *Pasteurella pestis* (EB strain) on agar medium containing 0·4% of glycine led to the formation of a capsular mucopolysaccharide with the properties of hyaluronic acid ; this material depolymerized on incubation, giving a toxin (toxin I) which was separated by centrifugation. Another toxic product was obtained by growing the EB strain on ordinary agar, washing off with distilled water, and adding a solution of glycine (" 1, 2 or 3% strength ") to the suspension ; lysis of the organisms resulted, the supernatant after centrifugation being designated toxin II. The median lethal dose of toxin I for mice inoculated subcutaneously was 0·001–0·0025 ml. and of toxin II was 0·005–0·01 ml.

The 2 toxins differed antigenically, and each evoked the formation of antitoxin in rabbits. Immunization of mice with live vaccine to which heat-inactivated toxin I had been added was significantly more effective than when live vaccine alone was employed. It is considered that a combination of live vaccine with inactivated toxin opens prospects of improvement in immunization against plague. *R. S. F. Hennessey*

SEMENOVA, E. L. **Influence on the Virulence of *Pasteurella pestis* of the Body of an Animal with Natural Insusceptibility.** [Abstract.] *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 8, 1198–1200. [Translated from Russian.]

Levi, M. I., Chernov, S. G., Labunets, N. F. & Kosminsky, R. B. [**Aspiration Method for the Collection of Fleas from Rodents' Nests**] *Med. Parasit. & Parasitic. Dis.* Moscow. 1959, v. 28, No. 1, 64–9, 3 figs. [14 refs.] [In Russian.]

The English summary appended to the paper is as follows:—

"At present the collection of fleas from rodents' nests is effected with the aid of flannel bands, by removing the substrate or by digging out the nests. In this work it is suggested to use for this purpose the method of aspiration—i. e. air-suction by means of a motor-car engine or a vacuum cleaner. The method proposed was successfully tried out in conditions existing in Daghestan and Azerbaidzhan on the fleas of ground squirrels and red-tailed sand-martins. The article contains an inference on the efficacy of the aspiration method for the purpose of epizootiological exploration."

Freedman, M. L. **The Practical Aspects of Plague Control.** *Pub. Health.* Johannesburg. 1959, Feb., v. 23, No. 1, 19–29.

This paper deals with the epidemiology of plague and its control in southern Africa. Human infection there mainly results from transient murine foci derived from the permanent sylvatic foci, and the evidence suggests that domestic infection can only be maintained by periodic re-infection from sylvatic sources. *Mastomys* is the strongest link between the 2 cycles. *Pulex irritans* appears at times to be a plague vector and both *Pediculus humanus* and *Echidnophaga* have been found infected.

It is suggested that ultra-violet lamps might be effective in protecting stores from attack by rats and mice. Referring to the use of vaccines in plague control, live vaccine is disliked because it often produces a sharp reaction; killed vaccines if they contain, or produce in man, Fraction 1 antigen will increase resistance in some 50% only of those inoculated, but in endemic regions this proportion is increased by re-inoculation 3 to 6 months later. Annual re-vaccination progressively increases the resistance of the population at risk. Rodenticides and pulicides are discussed and it is recommended that 5% DDT should be added to Cyanogas to provide residual insecticidal effect. In Bechuanaland dusting of huts with DDT twice, and later once, a year has satisfactorily controlled fleas and plague transmission. It is suggested that rodent proofing regulations should be modified in the light of advances in building science, and attention is drawn to the need for prevention of access by rats to food stores for livestock and to improperly cleaned vessels used in the preparation of food. Diagnostic puncture of buboes should be avoided; in the author's experience patients so treated never recovered. Modern methods of treatment and prophylaxis of plague are discussed.

[This paper gives some useful practical control techniques.] *T. H. Davey*

Canalis, A. & Sepulcri, P. Prescrizioni mediche ufficiali e altri provvedimenti di governo in Venezia nella peste del 1575–1576. [**Medical Prescriptions and other Measures adopted by Government in Venice during Plague Epidemic of 1575–1576**] *Ann. d. San. Pubblica.* Rome. 1958, Nov.–Dec., v. 19, No. 6, 1201–14. [11 refs.]

The English summary appended to the paper is as follows:—

"This paper deals with the measures adopted and the remedies suggested by the Public Health Magistrate in Venice during the plague epidemic which occurred in 1575–1576, according to a manuscript codex by notary Cornelio Morello.

"The measures concerned with persons and goods proceeding from foreign countries, both 'by sea and by land', will be dealt with in a further paper."

HAYES, W. J., Jr. & GAINES, T. B. **Laboratory Studies of Five Anticoagulant Rodenticides.** *Pub. Health Rep.* Wash. 1959, Feb., v. 74, No. 2, 105–13, 2 figs. [13 refs.]

"A new laboratory method was devised for the rapid evaluation of multiple-dose, slow-acting rodenticides with respect to required dosage, bait refusal, and speed and variability of action. With this method, it was found that, in general, wild Norway rats are most susceptible and roof rats least susceptible to each anticoagulant compound tested. Wild mice tend to resemble Norway rats in susceptibility, but they resemble roof rats in the high variability of response. The performance of warfarin was not excelled by the other anticoagulant compounds tested, although coumachlor, Diphacinone, and Pival were each about equal to warfarin against 1 or 2 species. PMP was distinctly inferior in performance. A short supply of animals prevented testing coumachlor against mice or Diphacinone against roof rats or mice."

KHUNDANOV, L. Y., SHERSHNEV, P. A., SHKURKO, Y. D., KALMYKOVA, A. P., TOKAREVA, A. A., LIASKOVSKAIA, Y. I. & MIKHALEVA, V. I. **The Therapeutic and Prophylactic Properties of Separate Fractions of the Proteins of Plague Antiserum.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 7, 1067–8. [Translated from Russian.]

"(1) The protein fractions of plague antisera (the β- and γ-globulins, as well as the total globulins), injected into experimental animals sensitive to plague, exerted prophylactic and therapeutic effects which were most clearly demonstrated by the γ-globulin fraction.

"(2) The effectiveness of the whole serum and its protein fractions is a direct function of the content of γ- and, to a certain extent, of β-globulin fractions—the higher the content of these fractions in the preparation, the more effective the preparation is found to be.

"(3) For purifying the whole serum from inert proteins (albumins and α-globulins) and in concentrating the immunologically active fractions (γ- and β-globulins), the alcohol-water method of fractionation in the cold is more satisfactory than the salting-out method."

KHUNDANOV, L. E., KOLESNIK, V. S. & PLETNIKOVA, G. P. **The Comparative Immunogenic Effectiveness of Plague Antiserum and its Globulin Fractions.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 7, 1123–4. [Translated from Russian.]

"The results given allow one to conclude that animals which received plague antiserum and its fractions had greater resistance to plague infection, and that

judging from the pathological findings, γ-globulins had a more marked action than total globulins and untreated serum."

BLIAKHER, S. L. **Use of Mice treated with Cortisone as an Experimental Model in the Study of Strains of *Pasteurella pestis* with Reduced Virulence.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 7, 1077–84, 3 figs. [22 refs.] [Translated from Russian.]

"(1) A single injection of 3·5 mg of cortisone in mice markedly increased their sensitivity to strains of *P. pestis* with reduced virulence. Subcutaneous administration of 500,000 organisms of the EV-76 strain to mice treated with cortisone caused the death of 80–90 per cent of the animals with signs of acute septicaemic plague, which was never observed in untreated animals. With intravenous injection of *P. pestis* the mice receiving cortisone proved even more sensitive—1000 organisms of the EV-76 strain were sufficient to kill all the animals with signs of septicaemic plague.

"(2) Mice treated with cortisone constitute a highly sensitive experimental model for studying strains of *P. pestis* with reduced virulence.

"(3) Mice treated with cortisone may be used in biological tests in the investigation of various materials for presence of plague infection, especially where the *P. pestis* count is low or the organisms possess reduced virulence."

[See this *Bulletin,* 1955, v. 52, 898.]

SMITH, P. N. **Pneumonic Plague in Mice. The Effect of Polyvinylpyrrolidone.** *Amer. J. Hyg.* 1959, Jan., v. 69, No. 1, 21–4, 2 figs. [10 refs.]

Mice were immunized by subcutaneous inoculation of living avirulent *Pasteurella pestis* and 10 days later inoculated intraperitoneally with 0·5 ml. of polyvinylpyrrolidone (PVP) solution daily for 14 days before exposure to an aerosol of *P. pestis.* To determine the degree of reticuloendothelial blockade India ink was administered intravenously or by intranasal instillation and sections from the lungs, liver and spleen examined later for the presence of carbon particles. Phagocytosis of avirulent *P. pestis* was determined by inducing a peritoneal exudate in mice treated with PVP, introducing avirulent *P. pestis* 24 hours later and ascertaining the percentage of neutrophils in the exudate which contained *P. pestis.*

The experiments showed that PVP is an effective reticuloendothelial blocking agent. PVP failed to protect against plague toxin. It did not modify the susceptibility of actively immunized mice to pneumonic plague though it did inhibit the early clearance of *P. pestis* from the lungs of non-immune mice. Dissemination of *P. pestis* from the lungs to other organs was delayed in animals treated with PVP. *P. A. Clearkin*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

DAVIES, J. N. P. **James Christie and the Cholera Epidemics of East Africa.** *East African Med. J.* 1959, Jan., v. 36, No. 1, 1–6.

Professor Davies has rendered a valuable service in drawing attention to the work of Dr. James CHRISTIE and his publication in 1876 of a monograph on the Cholera Epidemics of East Africa. Christie practised in Zanzibar from 1865 to 1874 and by patient enquiry at this commercial, but then insanitary, capital was able to map with considerable accuracy the spread of cholera through the mainland of East Africa. In the 1869–1870 epidemic which involved Zanzibar itself the 60 European residents were unaffected (the only European resident dying from cholera was a missionary infected elsewhere) but on ships in the harbour 19 American and European sailors died. The total cholera deaths on the island were estimated at from 20,000 to 30,000.

[It is salutary to be reminded that East Africa's long period of freedom from cholera is not due to some inhibitory climatic factor. The continuance of bacillary dysentery and typhoid fever illustrates both the present limitations in hygiene in East Africa and differences in the ease of spread of these diseases and cholera.] *Frederick J. Wright*

TANAMAL, S. T. W. **Notes on Paracholera in Sulawesi (Celebes).** *Amer. J. Trop. Med. & Hyg.* 1959, Jan., v. 8, No. 1, 72–8. [13 refs.]

In this article the author records some interesting observations on 4 epidemics of paracholera occurring in the period 1937–1958 in Sulawesi (Celebes) in the Republic of Indonesia, in the investigation of all of which he was personally concerned.

The causative organism conformed closely to the classical El Tor vibrio of Heiberg I type, in morphology and in both biochemical and serological reactions, but marked differences were noted in its epidemiology. The chief difference was in its degree of pathogenicity. While the classical El Tor vibrio is non-pathogenic, or at most a feeble pathogen, its congener in Sulawesi is highly pathogenic, producing, in the cases observed and recorded, a mortality of 88 to 90%, but fortunately the morbidity rate is conspicuously low, being 2·2 per 10,000 inhabitants of Macassar and even less for the inhabitants of the island as a whole, and there is little tendency for any outbreak to assume an epidemic or endemic character. In the last few months, however, of the period under review, there was some evidence of an endemic trend.

The qualities of the paracholera infection as seen in Sulawesi, which differentiate it from Asiatic cholera on the one hand and the classical El Tor infection on the other, are its sporadic occurrence, its low morbidity rate and its high mortality rate. These well-marked points of difference lead the author to suggest that the Sulawesi vibrio should be designated the *Vibrio de moor*, after the scientist who first described it in 1938 [this *Bulletin*, 1939, v. 36, 374].

E. S. Phipson

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

PHILLIPS, B. P., WOLFE, Patricia A. & BARTGIS, Ida L. **Studies on the Ameba-Bacteria Relationship in Amebiasis. II. Some Concepts on the Etiology of the Disease.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 392–9.

In a previous paper [this *Bulletin,* 1956, v. 53, 445] it was shown that *Entamoeba histolytica* failed to establish an infection in " germfree " guineapigs, but produced ulcerative amoebiasis in animals with a conventional intestinal flora. In order to explain this phenomenon the authors carried out experiments to determine the physico-chemical conditions in the gut of " germfree " guineapigs. It was found that the oxidation-reduction potential in the latter was −90·3 mv, whereas in the conventional animals it was −367·2 mv, the difference being 276·9 mv. However, in both groups the *p*H of the gut was similar, *viz.,* 6·7–7·5 in the " germfree " animals and 6·8–7·8 in the conventional ones. When " germfree " guineapigs received reducing agents (thioglycollate or L-cysteine HCl) together with an inoculum of *E. histolytica* (grown with *Trypanosoma cruzi*), small lesions containing amoebae developed at the site of intracaecal injection. Similar localized lesions were produced in animals whose caecal wall was subjected to severe trauma. However, in all these cases the lesions were walled off by the defence mechanism of the host, and no ulceration or disease developed.

In order to ascertain whether bacterial factors promoting the development of amoebiasis, with its accompanying pathological changes, were present in inactivated bacteria or their metabolic products, the autoclaved caecal contents or their filtrates from conventional guineapigs were fed to " germfree " guineapigs before and after intracaecal inoculation of the amoebae. In some of the animals lesions containing amoebae developed at the site of inoculation. Similar results were obtained with autoclaved cultures of *Bacillus subtilis,* but in " germfree " animals contaminated with these organisms inoculation of the amoebae produced in some cases extensive ulceration of the caecum.

From these and other experiments " It was concluded that bacteria are involved essentially in the etiology of intestinal amebiasis and that synergism of ameba and bacteria is a prerequisite to development of the disease ".

C. A. Hoare

DOLKART, R. E. & HALPERN, B. **A New Monophasic Medium for the Cultivation of** *Entamoeba histolytica. Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 595–6.

On the assumption that the mucus on the surface of the intestinal wall might contain growth factors for *Entamoeba histolytica,* the authors devised a monophasic medium consisting of 5 gm. gastric mucin powder (Wilson No. 440) and 100 ml. distilled water. After the mixture is autoclaved for 15 minutes at 15 lb. pressure and centrifuged at 2,000 r.p.m., the supernatant fluid is removed and kept as stock gastric mucin medium. For cultivation of the amoebae two

modifications were used: (1) stock medium diluted to 1% with 0·8% saline, to each 2·5 ml. of which 0·5 ml. Balamuth's medium was added; (2) stock medium diluted to 1% with M/15 or M/30 K_2HPO_4-KH_2PO_4 containing 0·8% NaCl.

Two strains of *E. histolytica* with mixed floras were successfully cultivated in this medium. The best results were obtained with the first modification, in which the amoebae were maintained for one year at 37°C., with transfers 3 times weekly, and average yields of 20 to 30 thousand amoebae per ml.

C. A. Hoare

Buonomini, G. & Ricciardi, M. L. Studio dei fenomeni immunitari nella amebiasi. Nota I. Il problema della preparazione di antigeni per la fissazione del complemento. [**Study of Immunological Phenomena in Amoebiasis. I. Preparation of Antigens for the Complement-Fixation Test**] *Riv. Istituto Sieroterap. Ital.* 1958, Nov.–Dec., v. 33, No. 6, 369–75. English summary (5 lines).

Having obtained unsatisfactory results with antigens of *Entamoeba histolytica* prepared by different methods, the authors devised the following procedure for the complement-fixation test in amoebiasis. (1) The sediments of 48-hour cultures in Boeck and Drbohlav medium are centrifuged at 1,000 r.p.m. for 15 minutes, in order to remove the concomitant flora; (2) the resulting sediment is washed thrice by centrifugation in Locke solution; (3) the dense suspension of amoebae is diluted to produce a concentration of 1,000 trophozoites per 1 cc.; (4) the final suspension is distributed in test-tubes and frozen to −30°C. and thawed at +40°C., three times in succession; (5) the cryolysed organisms (cryolysate) are centrifuged at 15,000 r.p.m. for 15–20 minutes at the temperature of a refrigerator. The antigen resulting from these operations is perfectly clear and contains all the essential constituents of the amoebae.

Immune serum is produced by intravenous inoculation of rabbits, thrice weekly for 3 weeks, with 2 cc. of antigen. The complement-fixation test is carried out by the method described by Bozicevich *et al.* [this *Bulletin,* 1946, v. 43, 798].

The results of tests carried out with a number of strains of *E. histolytica* have shown (1) that antigens prepared by this method were only slightly anti-complementary but showed good antigenic activity and (2) that they were strain-specific, a fact which was confirmed by absorption of antibodies by the D'Alessandro and Sofia method.

C. A. Hoare

Hervé, A., Courson, B., Parodi, L. & Piganiol, G. Un cas d'amoebome à triple localisation. [**Amoeboma with Triple Localization**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 628–31. [11 refs.]

While amoeboma is rare, multiple amoebomata are very exceptional. At operation on a Vietnamese, aged 40 years, a large hard irregular tumour was found in the transverse colon, with hard associated glands; this was considered to be malignant, and a colectomy was decided on. On attempting this another similar but smaller tumour was found at the left colic angle, and yet a third involving the caecum. The diagnosis of malignancy was revised in view of this; the surgical treatment was modified; and emetine treatment was started with an ultimate excellent result. Sections of the tumours confirmed the

absence of malignancy but failed to reveal the actual presence of amoebae; their inflammatory and cellular characters were considered to be consistent with an amoebic causation, and this was confirmed by the clear response to specific anti-amoebic treatment. *A. R. D. Adams*

GOLDSTEIN, R. H., OXENSTEIN, A. & CAHILL, F. P. **Amebic Granuloma of the Transverse Colon. Report of a Case.** *New England J. of Med.* 1959, Mar. 19, v. 260, No. 12, 599–601, 2 figs.

"A case of amebic granuloma of the transverse colon is presented. The surgical treatment consisted of a radical subtotal colectomy, with a primary end-to-end anastomosis of the terminal ileum to the mid-sigmoid colon."

FRYE, W. W. **The Pathogenesis and Therapy of Human Amoebiasis.** *Med. Proc.* Johannesburg. 1959, Feb. 21, v. 5, No. 4, 75–85. [35 refs.]

This paper covers a very wide field, and is a review of its subject-matter; it is not a fresh contribution to knowledge. The coverage is comprehensive and authoritative. Factual in presentation, dispassionate and unbiased in approach, it might well be read with salutary effect by many who discount the careful detailed work that has been done on amoebiasis by a multitude of experienced workers over a long period. Here will be found no extravagant claims for amoebicides, either old or new, but a well documented appraisal of the virtues and defects of those still generally believed to be of value for the purpose for which they are given. *A. R. D. Adams*

NOHMI, N. Tratamento da amebíase intestinal pelas quinono-fenantrolinas e iodocloroxiquinoleina. [**Treatment of Intestinal Amoebiasis with Quinono-Phenanthrolines and Iodochlorhydroxyquinoline**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, Aug., v. 15, No. 8, 547–50.

The English summary appended to the paper is as follows:—

"23 cases of intestinal amoebiasis were selected by the author but, for her final conclusions, she took into consideration only 15 of these which had been under observation for at least one month after the beginning of treatment. Of these 15 patients 11 took the drug 11'925 [Entobex]: 4 improved after one series, 4 improved after two series and 3 had to take a third series (not controlled). Four patients took 11'925-C. Two of them showed clinical and parasitological improvement after one series while two needed the administration of a second series. Tolerance for 11'925 was good but was better for 11'925-C. The best formula was 10 mg. of 11'925-C per kilo of body weight per day for 10 successive days and at the same time 500 mg daily of iodochlorhydroxyquinoline [Enterovioform] divided into two equal parts. Tolerance permitting, a second series of the doses of the same drugs can be administered. With this treatment the author obtained clinical and parasitological improvement in 50 per cent of her cases after one series of 11'925-C and in 100% of cases after two series. Using the drug 11'925 she obtained improvement in 36·36 per cent of cases after one series, 36·36% after two series and 27·27%

after 3 series. She feels that more experimental data are necessary to gauge the action of 11'925-C and of 11'925."

[See also this *Bulletin,* 1959, v. 56, 163 *bis.*]

HERMELINK, B. Klinische Erfahrungen mit 5,7-Dichlor-8-hydroxychinaldin bei der Behandlung von Amöbenruhr und anderen infektiösen Darmerkrankungen sowie deren Folgezuständen. [**Clinical Trials with 5,7-Dichloro-8-hydroxyquinaldine (Siosteran) in Amoebiasis and Other Intestinal Infections**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 277–87. [Numerous refs.]

Siosteran (Geigy) is a new hydroxyquinaldine derivative represented by 5,7-dichloro-8-hydroxyquinaldine. It contains no iodine, which is an advantage to patients who are sensitive to this halogen. It is dispensed in dragées containing 0·1 gm. of the basic principle. 200 patients have been treated in all, but in 151 exact clinical observations were made. Of these 53 had amoebic infections (*E. histolytica*), 11 had *E. coli,* 35 post-dysenteric colitis, 17 simple colitis, 21 acute colitis, 8 dyskinesia of bowel from damage from antibiotics, 4 had giardiasis, 1 typhoid and 1 *Monilia* infection of the intestinal tract. In the amoebic group *E. histolytica* was diagnosed after purging with Carlsbad salts.

The Siosteran course consisted of 3 × 0·2 gm. courses by mouth for 10 days, together with enemata of Siosteran suspension in gradually increasing dosage (0·1–0·6 gm. in 200 cm. tepid water). With a few exceptions this therapy was well tolerated. At the termination of this course no more amoebae could be found except for one particularly heavy infection when it had to be repeated.

In spite of the favourable action of Siosteran the possibility of extra-intestinal amoebiasis had to be envisaged and a chloroquine course was prescribed, to a total of 10 gm. over a period of 14–30 days. Evidence was obtained that Siosteran is lethal to *E. coli.*

Favourable results were recorded with the other bowel conditions tabulated above and it is claimed that the *Monilia* infection was also cured.

Philip Manson-Bahr

CHAUDHURI, R. N., SAHA, T. K. & ROY, N. **Experimental Amebiasis—a New Approach.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 644–5, 3 figs.

The authors describe an apparatus for use as an artificial fistula, to connect the caecum with the surface of the abdomen, in animals experimentally infected with *Entamoeba histolytica.* The fixture, which is a modification of that described by SVANIDZE [this *Bulletin,* 1955, v. 52, 45] consists of a hollow threaded metal tube, 1 inch long, fitted with a disk at one end and a cap at the other, with a washer and nut in the middle. To fit this tube, the abdomen of the animal is opened, its caecum is brought out and a double purse-string suture is made through the sero-muscular layer ; then an incision is made through this area and the disk-end of the tube is inserted into the lumen of the caecum. After this, the sutures are tightened around the tube and the caecum is replaced within the abdominal cavity, leaving the rest of the tube exposed. The

abdomen is sutured, and the tube is kept in position with the help of the washer and nut, while the outer end of the tube is closed with the cap to prevent the escape of the caecal contents. The skin stitches are removed on the sixth day, and by tenth day the animal is ready for experiments. The amoebae can be inoculated intracaecally through the tube, and the progress of infection, as well as the effect of amoebicidal drugs, can be studied by regular removal of the caecal contents for examination. Three illustrations show the tube and its application. *C. A. Hoare*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FAWDRY, A. L. **Notes on Leprosy in Aden.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 114–17.

Leprosy is not considered to be a major public health problem in the Aden Colony. Most of the 126 patients recorded in the last 26½ months live by begging. Most of them come from outside the colony, 60% coming from Yemen. The majority are of the tuberculoid type, and only 19 are recorded as lepromatous. Since April 1958 there has been a leprosy clinic, but attendances are irregular as patients have to come a long distance. A former mission leprosy hospital was stopped during the war and has not been restarted. The chief difficulty in eradicating the disease is the lack of supervisory health personnel. *Ernest Muir*

KITANO, H. [**Epidemiological Studies on Leprosy in Gifu Prefecture. III. Vital Statistics of Leprosy Patients**] *Lepro.* 1958, Mar., v. 27, No. 2, 161–70. [In Japanese.]

The English summary appended to the paper is as follows:—

"The vital statistics of leprosy patients in Gifu prefecture between 1936 and 1955 were studied. Besides the 292 patients reported in a previous paper, 43 patients have been added for a total of 335 (1·2 per 100,000 per year). The rate of incidence is slightly higher than in the previous report but there were no significant alterations epidemiologically.

"There was a total of 253 deaths, 244 from illness and 9 suicides and the death rate has dropped sharply in recent years and is one-fourth that of the war years. Mortality was 2·4%. The rate of suicide was 3·8% and slightly higher than that of the general population. The deaths according to sex has altered since 1945 with a drop in male deaths so that there is no longer a marked difference between male and female deaths (1936–40—1 : 3·56, 1941–45—1 : 3·04, 1946–50—1 : 1·76, 1951–55—1 : 1·70).

"The average age of death was 45·2 years and there has been a rise of 11·7 years in the 20 year period but in 1951–55, it was male, 52·1 years and female,

58·3 years. This prolongation of life coincides with the increase in life span of the Japanese people in general except for effect of the suckling deaths.

"There has been an increase of 335 (new cases) against a decrease of 314 (253 deaths, 35 fate unknown, 26 cured or improved) in the 20 year period for a total increase of 21 cases. An increase in the lepromatous type and in female cases has taken place. A marked rise in leprosy in Koreans is also noted. There were 137 cases being treated at home at the beginning of 1936 but has decreased to 24 in 1955."

[See this *Bulletin,* 1958, v. 55, 1333.]

BRUN, R., GAY-PRIETO, J. & JADASSOHN, W. Appareil d'ionophorèse et technique du test de transpiration pour le diagnostic de la lèpre. [**Iontophoresis Apparatus and Technique of Transpiration Test for the Diagnosis of Leprosy**] *Schweiz. med. Woch.* 1959, Feb. 14, v. 89, No. 7, 179–81, 4 figs.

This paper adds 2 new print methods to the large number already in use for outlining active sweat glands. The first uses brom-phenol blue formation from constituent powders adhering to Scotch tape and the other prussian blue formation with the use of chromatograph paper.

Sweating is provoked by iontophoresis of pilocarpine or acetylcholine by standard method. The test may be used in diagnosis of leprosy where sweating is defective, in defining the extent of neurological lesions and in studying the action of parasympathomimetic drugs.

A portable battery-operated iontophoresis apparatus is described.

M. L. Thomson

ARU, L. Il quadro-sieroproteico nella lepra. [**The Serum Protein Picture in Leprosy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Aug., v. 39, No. 8, 527–42, 15 graphs. [16 refs.] English summary.

The author has studied the serum protein of 15 patients with leprosy of varying degree and type. The serum albumin was low, and in all of them paper electrophoresis showed an increase in the gamma globulins. The alpha globulins were less regularly increased, and there was no change in the level of beta globulins as compared with normal.

The author considers the changes in the serum proteins, which can be noted on paper electrophoresis, to be a more sensitive indication of severity than the lability tests. There was a tendency for the gamma globulin to be particularly high in the lepromatous form of leprosy, and for the alpha globulin to be increased in the severe tuberculoid condition. *H. Lehmann*

CANNEFAX, G. R., ROSS, Hilary & BANCROFT, Huldah. **Reactivity of the RPCF Test in Leprosy compared with other Syphilis Tests.** *Pub. Health Rep.* Wash. 1959, Jan., v. 74, No. 1, 45–8. [11 refs.]

Sera from 248 patients suffering from leprosy, but presumably non-syphilitic, were submitted to five tests for syphilis which gave the following percentages

of positive results: TPI 4·8, RPCF [Reiter protein] 3·2, TPCF [*Treponema pallidum*] 15·3, VDRL 27·4 and Kahn 35·9. Results are set out in 4 tables.

TPI and RPCF agreed in 96% of cases and were presumably the most reliable.

The leprosy patients were divided into the following categories: active lepromatous, 167, arrested lepromatous, 56, active tuberculoid, 11 and inactive tuberculoid, 14.

[No explanation is given of the relatively large number of sera which reacted with the TPCF test and which might have been expected to agree with the other treponemal tests rather than with the VDRL or Kahn.] *T. E. Osmond*

Brown, J. A. K. & Stone, M. M. **The Depot Lepromin Test and BCG Vaccination.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 110–11.

The object of the "depot lepromin test" is to provide an indicator of weak reactors to normal lepromin. "The depot medium used consisted of one part of anhydrous lanoline and eight parts of light liquid paraffin. 0·25 gramme of autoclaved bacteriologically positive lepromatous tissue was ground into 4 ml. of medium and 1 ml. of isotonic saline to form a suspension in a concentration of 1:20. A dilution of 1:100 was made by adding medium and saline in similar proportions." This medium is applied by the multi-puncture route to the skin. The test was applied to 14 healthy children of about 1 year of age whose mothers were leprosy patients, both concentrations being used. All but 1 child were negative to both concentrations; this 1 child was positive to both. 5 weeks later 12 of the children were tuberculin tested, and all were negative. 10 were vaccinated with BCG and retested with 1:20 depot lepromin. The formerly positive child remained positive and the other 9 became positive. The signs of conversion appeared first in the final lepromin test within 4 weeks. Conversion in the original lepromin sites was about 2 weeks later. Depot lepromin injected by the multi-puncture route remained in the skin long enough to act as an indicator. *Ernest Muir*

Price, E. W. **Studies on Plantar Ulcers in Leprosy.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 98–105, 5 figs. on 5 pls. (1 folding).

This is a study in 2,395 leprosy patients of the distribution of plantar ulcers in relation to the stresses of standing and walking. There were 561 plantar ulcers, representing 11·7 per 100 feet. There were more ulcers in men than in women but there was no difference between right and left feet. Ulcers were found to overlie bony prominences, 71% being under the forefoot, 12·5% on the heel and 16·5% on the outer border of the foot. A single ulcer on one foot is the commonest occurrence, but 1 in 6 ulcer patients have one on each foot, and 1 in 5 ulcer patients have 2 on one foot. The positions of ulcers in order of frequency is: second metatarsal head, first metatarsal head, lateral metatarsal heads, tubercle on the base of fifth metatarsal, heel.

The second half of the paper describes the mechanics of the foot in relation to plantar ulcers, and is based on the previous work of D. J. Morton and N. C. Lake. The walking cycle is described under 7 headings. (1) The walking roll and sole pressures. In walking pressure passes rapidly from heel to fifth

metatarsal, across to the first metatarsal, and along the big toe to its tip. Each of these pressures may measure as much as one-half the body weight. Compared with this, in standing the body weight is distributed over the whole pressure-bearing area of the soles. (2) The " angle of gait " (degree of pointing outwards of the toes) alters the pressures. The wider the angle the more medial the pressures and consequently the ulcers. In women who carry heavy weights including children the angle may tend to be diminished, and the ulcers are formed more laterally. (3) A study of the sole-dorsiflexion during the walking roll shows the stress on the head of the first metatarsal, where the flexion is of about 40 degrees, and the considerable friction engendered is absorbed by the cartilage buffer. (4) The function of the big toe in walking is the thrust forward which increases with speed and in walking uphill or in sandy soil. (5) The intrinsic muscles of the foot are very important in the stability of the toes and in protecting the sole from damage. The flexion of the proximal inter-phalangeal joints of the lateral toes depends on these intrinsic muscles, whereas in the hand it is a forearm muscle that causes flexion. (6) The role of plantar sensation is important in judging the weight that must be transferred to the sole to prevent a fall according to the nature of the ground surface. In the absence of this sensation excessive weight has to be placed on the foot to be sure that friction is adequate to prevent slipping. (7) Types of gait are described. The rigid gait is advised in treatment and prevention of sole ulcers, as being least likely to cause damage. [This article is worthy of careful study in the original by all who are interested in the treatment of leprosy.]

Ernest Muir

ASANO, M. [**A Case of Carcinoma of the Tongue in a Leprosy Patient**] *Lepro.* 1958, Mar., v. 27, No. 2, 139–42, 6 figs. [In Japanese.] English summary (9 lines).

DAVISON, A. R. **Erythema Nodosum Leprosum.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 112–13.

This study was to determine the prognostic significance of erythema nodosum leprosum (ENL) as regards length of treatment and the bacteriological index (BI). Of 100 patients with low BI (average of $1\frac{1}{2}$) 24 with no ENL took 57 months to become negative, whereas 76 who had ENL took 65 months or more. In 98 patients with long duration treatment (79 months) 85 with ENL took 79 months to become negative, and 13 without it took 77 months. From this and other experiments it is concluded that ENL is of bad prognostic significance, and the lower the original BI the less ENL develops. ENL does not depend on the degree of positivity but on the duration of treatment.

[See also this *Bulletin,* 1958, v. 55, 526.] *Ernest Muir*

THANGARAJ, R. H. **Camoquin in the Treatment of Acute Lepra Reaction.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 106–7.

Of 3 groups of 15 patients each suffering from lepra reaction, 1 group was left untreated as a control, another group was treated with potassium antimony

tartrate 0·02 gm. rising to 0·05 gm. intravenously on alternate days, and the third group had camoquin [amodiaquine] in the form of a 0·25 gm. tablet twice a day, for 4 days. The best results were with camoquin under which the reaction subsided in 4 patients in 2 days, 4 in 3 days, 3 in 4 days and 2 in 5 days. The last 2 patients had to be given potassium antimony tartrate before the reaction subsided on the 10th day. With potassium antimony tartrate the reaction subsided in 5 patients by the 4th day, in 6 by the 8th day, and in 3 by the 12th day, the last patient having to be given cortisone. In the control group 3 subsided by the 4th day, and another 6 by the 8th, while the rest had to be given potassium antimony tartrate or cortisone. It is therefore considered that camoquin is effective and acts more rapidly on the whole than potassium antimony tartrate. *Ernest Muir*

Schneider, J., Jardin, C., Jonchere, H., Raud, J., Tate, J., Priolet, G. & Chavanne, P. Essais de nouvelles suspensions aqueuses de diamino-diphénylsulfone pour injections-retard dans le traitement de la lèpre. Emploi de la carboxymethylcellulose, succedane stable de la gelose. [**Trial of new Aqueous Suspensions of Diamino-diphenylsulphone by Slow-absorption Injections in the Treatment of Leprosy. The Use of Carboxy-methylcellulose**] *Méd. Trop.* Marseilles. 1959, Jan.–Feb., v. 19, No. 1, 23–35, 7 graphs.

The object of this study was to obtain a slowly absorbed form of DDS suspension for administration to leprosy patients who can be treated only at long intervals. Of the substances formerly used, the large crystal variety of DDS is almost impossible to pass through the needle, and the medium-sized crystals are absorbed almost as fast as the small ones. Chaulmoogra ester suspensions, though more regular in their absorption than saline-agar suspensions, have on the whole less retarding action than the latter.

To obtain a suspension with a well retarded and yet regular absorption rate, and which would not cause local irritation, carbomethylcellulose of sodium (CMC) was tried. 20 gm. of DDS was suspended in 100 ml. of a 2 per 1,000 solution of CMC in normal saline. It was found that the CMC suspension withstood the light of the tropical sun better than the agar suspension. Injected into rabbits, the local irritation was less with CMC. Injected into patients, the CMC suspension had a retarding effect similar to that with agar suspension, but it caused much less local irritation in the muscles. With the CMC suspension it is possible to give a twice-monthly injection of 1·25 gm. of DDS, or if necessary a monthly injection of 2 gm. of DDS. It is thus possible by using CMC and giving a large dose of DDS suspension to maintain regularity of absorption over a long period. *Ernest Muir*

Floch, H. & Mailloux, M. Intérêt thérapeutique de la sulfone mono-isopropylée dans la lèpre. [**Therapeutic Advantage of Mono-isopropyl Sulphone in Leprosy**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 445.* 1958, Apr., 4 pp.

The authors describe in detail the histories of 8 cases of leprosy (6 lepromatous, 1 borderline and 1 tuberculoid) treated with mono-isopropyl sulphone, over periods varying from 2 to 2½ years. The clinical, bacteriological and

histological results in all the patients were equal to those obtained with DDS, but the remarkable feature was the tolerance of the drug. It was given orally, and it was possible after a dosage of 100 mgm. daily for a month to raise the dose to 200 mgm. Only in the case of 1 patient, who was hypersensitive to sulphones, did lepra reaction occur. *Ernest Muir*

SATANI, Y. *et al.* **[Intracutaneous Injection of Acidomycin in the Treatment of Leprosy]** *Lepro.* 1958, Mar., v. 27, No. 2, 143–59, 22 figs. [In Japanese.]

The English summary appended to the paper is as follows:—

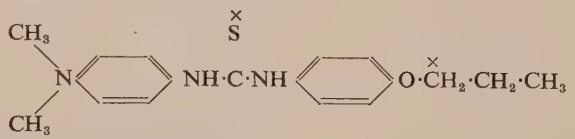
"The therapeutic results of intracutaneous injection of Acidomycin in leprosy has been reported previously (La Lepro, Vol. 24, No. 3, June 1955, Internat. J. Leprosy, Vol. 23, No. 2, 1955) [this *Bulletin,* 1956, v. 53, 328]. Treatment with this agent has been continued at various institutions for various lengths of time, 3–6 months at the shortest, 4 years at the longest, and the results are presented here.

"The total number of cases treated was 129, including 88 cases of lepromatous leprosy and 41 cases of macular leprosy (some neural type included). The greatest effect was observed in the macular type, the majority of those responding belonging to this group, while only a few of the lepromatous type showed a response. It is noteworthy that improvement in the sensory disturbance and lessening of the neural thickening took place with long-term treatment.

"The mechanism of action of this agent has not been adequately clarified but from the findings that intramuscular injection of Acidomycin has no effect and intracutaneous injections of streptomycin and INAH are ineffective it is suggested that Acidomycin acts specifically on the host tissue rather than acting as a typical chemotherapeutic directly on the leprosy bacilli."

SCHMID, K. & TRIPOD, J. **Experimental Investigation of the Absorption and Excretion of CIBA-1906 (DPT).** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 85–97, 9 figs.

Earlier studies by means of colorimetric methods with the substance named in the title (DPT) had suggested that it was largely excreted unchanged in the faeces. The present investigation deals with similar studies with material labelled with ^{14}C and ^{35}S. The method of synthesis of these substances is outlined, and it has the following formula



$C^{\times}$ or $S^{\times}$ represent the labelled atoms.

The ^{14}C compound had a specific activity of 0·2 μC/mgm. and the sulphur-labelled compound a specific activity of 2·7 μC/mgm. To measure activity known volumes of body fluids or known weights of organ or tissue were dried. ^{14}C was converted to $^{14}CO_2$ for measurement of activity and ^{35}S to $Ba^{35}SO_4$ for this purpose. Studies of drug distribution were carried out in the rabbit

and dog after oral, intravenous or subcutaneous dosage. The excretion pattern varied according to the mode of administration. After intravenous injection of the drug in rabbits radioactive material was found in the intestinal contents indicating that excretion had taken place through the gut wall. Excretion also occurs *via* the bile. The pattern of excretion under different conditions and distribution of DPT in organs is clearly demonstrated by tables and figures. In attempts at isolation and identification of metabolites of DPT in the urine of rabbits after intravenous dosage, 4 mgm. of material was isolated by extraction. The *in vitro* tuberculostatic activity of the substance was, however, very small and paper chromatographic techniques showed that 2 substances were present which appeared to be unstable. These experiments with labelled compounds indicate that absorption was much more complete than had been indicated by chemical experiments.

[See also this *Bulletin,* 1957, v. 54, 1421.] *J. D. Fulton*

Brown, J. A. K. & Blenska, W. M. **Leprosy Control in Uganda. Duration of Treatment of Inpatients and Outpatients.** *Leprosy Review.* 1959, Apr., v. 30, No. 2, 108–9.

Statistics are given of 410 leprosy patients discharged since January 1957 from the Buluba and Nyenga leprosaria in Uganda. Of these 111 were in-patients and 299 out-patients. Of the tuberculoid and indeterminate types, despite the fact that in-patients are drawn from the more advanced or more seriously ill patients, " their discharge rate under four years was significantly higher than that for those attending as outpatients ". The authors do not argue in favour of increased or enlarged leprosaria, " but to emphasise the importance of treatment villages built by the community to enable the more infectious and those who live at a distance to obtain adequate treatment ". Details are given in 2 tables. *Ernest Muir*

Bergel, M. Activísima y acelerada reproducción del bacilo de Hansen inoculado a ratas en severas condiciones de prooxidación. [**Activation and Accelerated Reproduction of Hansen's Bacillus inoculated in Rats under Severe Conditions of Prooxidation**] *Semana Méd.* 1958, Dec. 18, v. 113, No. 25, 1119–24, 9 figs. English summary.

This is a continuation of a series of articles on this subject [see this *Bulletin,* 1958, v. 55, 172, 414, 527]. Two groups of rats of comparable age and size were chosen, the one for experimental use and the other as control. The control rats were given a full ordinary diet. The experimental group were given a diet of the following proportions: casein 23·8, yeast 8·9, mineral salts 3·0, maize starch 48·9, cod-liver oil 15·5, with 0·5 per 1,000 silver nitrate in their drinking water. Also from the 21st day of age they were injected once a week for 4 months with 3 cc. of total rat blood haemolysed in 3 to 4 cc. of twice distilled water. All the animals were injected intratesticularly on the 57th day after birth, *i.e.,* on the 36th day of special diet, with 0·1 cc. of a suspension of Hansen's bacilli obtained from a leproma. Descriptions are given of rats of both groups which died or were killed about 5 months after inoculation. The two characteristics of the experimental diet are the low content of vitamin E and the high content of strongly unsaturated oil ; the silver nitrate has an action

antagonistic to vitamin E, while the haemolysed blood is supposed to have a pro-oxidant effect.

It was found that in the experimental rats the bacilli had multiplied to a massive extent in the testes and had spread to the spleen, liver, lungs and other organs; while no such multiplication or spread was found in the controls. The practical uses of this rich extra-human supply of lepra bacilli are as follows: to administer to patients so as to change their reaction to lepromin; to study the chemical composition of the bacilli; to make studies in experimental animals of lesions of entry, of spread through the organs of the body, etc.; to study anti-leprosy drugs; to test the viability of lepra bacilli; to make various bacteriological, pathological and chemotherapeutic studies.

Ernest Muir

CHAPMAN, G. B., HANKS, J. H. & WALLACE, J. H. **An Electron Microscope Study of the Disposition and Fine Structure of** *Mycobacterium lepraemurium* **in Mouse Spleen.** *J. Bacteriology.* 1959, Feb., v. 77, No. 2, 205–11, 11 figs. [15 refs.]

The spleens were fixed for 6 days in osmium tetroxide solution at *p*H 8·5, and embedded in a mixture of butyl and ethyl methacrylates. Ultra-thin sections were then cut and examined in a RCA EMU-2D electron microscope.

The capsule-enclosing membrane, which separates the cytoplasm of the spleen cells from the bacterial cell, was sometimes clearly visible, and although the origin of this membrane is doubtful, it appeared to be a product of the tissue cell, especially as occasionally 2 or more bacilli were enclosed by the same membrane. The capsular space was occupied by a material which was more finely granular than that of the cytoplasm of the host's cells.

The bacterial cell wall appeared either as a solid ring 120–150 Å in thickness or as 2 concentric rings 40–50 Å thick, separated by a low density space of similar thickness. When this wall was closely appressed to the protoplast, the cytoplasmic membrane was not distinguished but became clearly visible when there was slight shrinkage.

Low density areas, considered to represent nuclear material, were present in many cells; in these areas there were sometimes thick threads of dense material 40–60 Å in diameter. The most striking cytoplasmic inclusion was a body limited by a membrane 40–60 Å in thickness, often appearing as a sac of 25–50 spheres, each 200 Å in diameter; this body is thought to correspond to mitochondria equivalents of other workers. Another inclusion body, which was only occasionally seen, was of low density and agranular; its significance was unknown.

The bacilli were never seen within the nuclei of the cells although occasionally they were present within an invagination of the nuclear membrane giving a false appearance of being intranuclear. No evidence was seen of the host cells having a deleterious effect on the bacilli.

S. R. M. Bushby

ROBSON, J. M. & SMITH, J. T. **Studies on the Multiplication of** *Mycobacterium lepraemurium* **in the Mouse Cornea.** *Brit. J. Exper. Path.* 1959, Feb., v. 40, No. 1, 33–9, 2 figs.

Mice were injected intracorneally with 0·001 ml. of a suspension of *Mycobacterium lepraemurium* and killed at intervals. The number of bacilli present

in the cornea were counted after the cornea had been digested with collagenase and hyaluronidase.

The results show that many of the bacilli disappear from the cornea during the first few days; these organisms apparently escape either extracellularly or inside of phagocytes and become widely disseminated. After about a week, when the epithelium has regenerated, no further loss occurs and then, for about 6 weeks, the number of bacilli increases rapidly, after which there is a progressive decrease in the rate, continuing until the end of the experiment (maximum 160 days). The reason for the change in the rate of increase is unknown but the changes in the number of bacilli parallel the development of the macroscopic lesions. The change in rate may be due to the development of immunity or, perhaps, to a loss of bacilli through the sclera.

This parallelism between the number of bacilli present in the cornea and the size of the macroscopic lesion, is considered to support the validity of assessing the value of chemotherapeutic drugs by their effects on the development of the macroscopic lesions.

[See also this *Bulletin,* 1956, v. 53, 1437.] *S. R. M. Bushby*

YAMADA, N. [**Haemagglutination and Haemolytic Reaction of Red Cells sensitized with Extracts of Murine Leprosy Bacilli**] *Lepro.* 1958, Mar., v. 27, No. 2, 126–35. [23 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

" Murine leprosy bacilli deprived of a lipoidal substance were broken down mechanically, distilled water of pH 7·0 added and heated. A Molisch reaction double positive, Ninhydrin reaction positive extract was obtained (crude antigen). This was adsorbed on bovine red cells and used for testing hemagglutination of murine leprosy serum and various other sera. The hemolytic reaction was also tested by the addition of complement. The results were compared to those obtained using old tuberculin as the antigen according to the method of Middlebrook and Dubos. The following was observed.

" 1) It has been proposed that a common antigen exists between M. tuberculosis, M. leprae and M. leprae murium on the basis of the finding that the hemagglutination against old tuberculin was specific in these three conditions. The findings in the present study appear to verify this.

" 2) The hemolytic reaction occurring on addition of complement to the hemagglutination reaction system using murine leprosy bacilli antigen is more specific and sensitive than hemagglutination, in the same manner old tuberculin antigen.

" 3) The reaction appears to be closely related to leprous involvements in the internal organs in murine leprosy. This coincides with the report of Kawaguchi.

" 4) About one-half of the sera of leprosy patients showed prozone in the hemolytic reaction using old tuberculin but it is suggested that this is not due to anti-complement action of the serum but a pattern occurring in the optimal relationship between antigen and antibody.

" 5) The hemagglutination and hemolytic reaction of tuberculosis serum and murine leprosy antigen are closely interrelated and coincide with the results obtained with old tuberculin antigen."

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

FÜLÖP, T. & KONDOR, L. Egy Szabolcs-Szatmár megyei község összlakosságának helmintológiai szürövizsgálata. [**Helminthological Screening in a Village of the Szabolcs-Szatmár Area, Hungary**] *Egészségtudomány*. Budapest. 1958, v. 2, No. 4, 289–94. [16 refs.]

The English summary appended to the paper is as follows:—

"Authors examined the entire population of the village Mánd for infestation with intestinal worms. They found an infestation percentage of 38·5. The infestation of school age was 64·3%, that of the adult 32·7%. Following worms were found (incidence in parenthesis) Trichuris t. (27%), Enterobius v. (10·6%), Ascaris l. (9·1%). Such screenings should, in the authors' view, be carried out also in other areas of the country."

VOSTA, J. Význam odpadních vod a sedimentů pro rozšiřování helminthiasí. [**The Significance of Sewage Water and Sediments in the Spread of Helminthiasis**] *Československ. Epidemiol., Mikrobiol., Imunol.* Prague. 1958, v. 7, No. 5, 340–43. English summary (8 lines).

In helminthological investigations carried out in 1954 and 1956 on the inmates of a children's mental hospital in Czechoslovakia an increase in infection with *Trichuris* from 180 of 494 patients (36·4%) in 1954 to 333 of 521 (64·0%) in 1956 was observed, and there was an even greater rise in the incidence of infection with *Hymenolepis nana*, from 0·2% to 21·0%. There was no essential change in the incidence of *Ascaris* and *Enterobius*. The sewage effluent from the hospital was not treated before discharge and ran in an open canal through the adjoining village; samples taken from it contained up to 880 eggs of *Ascaris* and 720 eggs of *Trichuris* per litre. Sediment from the settling tanks, which also contained eggs, was regularly removed and used for manuring the kitchen gardens of the hospital. The great increase in the incidence of *H. nana* infection was apparently due to the admission of an infected child who had not been adequately treated. *D. J. Bauer*

GRABOWSKA, M., NANKIEWICZ, J., LESZCZYNSKI, T., PACIOREK, H., ŚLEZAK, S. & ZWIERZ, C. Wyniki leczenia robaczyc jelitowych wśród pracowników przemysłu spożywczego. [**Results of Helminthiasis Treatment among Workers of Food-Supply Factories**] *Wiadomości Parazytologiczne*. Warsaw. 1959, v. 5, No. 1, 21–3.

The English summary appended to the paper is as follows:—

"The authors discuss the attempts of helminthiasis mass treatment under field conditions, among adult people periodically submitted to obligatory examinations for *Bacterium typhosum*. Füllenborn's, Rivas' and Faust's

methods as well as decantation and NIH tests were applied and the results obtained made it necessary to repeat the examinations at least 3 times more (table I). As to the frequency of invasion no distinct differences in particular age groups were found (table II). On the whole, among 1491 persons examined helminthiasis was found in 45·7% (table III). The highest percentage was shown by personnel from schools, infant schools and creches, the lowest—persons employed at hairdressers and wine and liqueur factories. Attention should also be paid to 6·4% *Taenia saginata* found in workers of butchery establishments.

" 6 months after the treatment control examinations of 817 persons were carried out (according to the schemes shown in table IV). In spite of unfavourable conditions (uncontrolled home treatment) a decrease of the general percentage by 17·7% was obtained."

WHO CHRONICLE. 1959, Jan., v. 13, No. 1, 2–56, numerous figs. [Refs. in footnotes.] **Bilharziasis.**

Each of the 5 papers making up this volume on schistosomiasis deals with a different aspect of the problem, and a useful list of studies and reports published by the World Health Organization on the subject is given at the end. The first paper is entitled " Nature and Extent of the Problem of Bilharziasis " and it includes a short history of the disease, an assessment of the problem of control and a description of the activities of WHO, illustrated by maps of the geographical distribution of the disease in some African territories. The second paper—" Bilharziasis as a Man-Made Disease "—points out that irrigation schemes are rapidly spreading the disease to new areas. It also describes briefly the ecology of African vector snails and the principles of control based on this knowledge. " Bilharziasis in the Laboratory " gives an account of the life history of these trematodes in laboratory animals and snail colonies. Magnificent photographs illustrate the brief text. The fourth papers deals with the use of molluscicides.

The final paper describes a pilot project in Leyte, concerned with the study and control of *Schistosoma japonicum* [this *Bulletin,* 1958, v. 55, 1350, 1351 ; 1959, v. 56, 325]. A census of man and domestic stock was made and 20% of each age-group of the human population had their stools examined for helminth ova. A high incidence of infection was found particularly in inland areas.

It was concluded that children in the 10- to 14-years age-group bore the brunt of the disease, and that many persons live in a state of natural balance with the parasite. Although there were 6 domestic animal hosts the main source of infection was man. Curves of repopulation for different rates of killing of *Oncomelania quadrasi* by molluscicides indicated that radical alteration of the habitat, so that the snail died out, would be cheaper than the use of molluscicides. Various ways in which the habitat could be altered are described, some of which increased crop yields.

[This series of papers gives a concise account of the present position in regard to schistosomiasis, which can be expanded in any particular aspect by reading the literature listed. All who have to deal with this disease will find here something fresh and interesting.] — *T. H. Davey*

SCHOFIELD, F. D. **The Schistosomal Complement-Fixation Test. Part I. The Diagnostic Value.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 64–70. [15 refs.] **Part II. Value as a Test of Cure.** *Ibid.*, 70–74.

The antigen used was prepared over 30 years ago by FAIRLEY from snail livers infected with *Schistosoma spindale* [this *Bulletin,* 1926, v. 23, 247; 1927, v. 24, 175 and 176]. It certainly had retained its antigenicity up to 6 years ago [*ibid.,* 1952, v. 49, 634], and it is stated to have suffered no loss until the present time. The sera of patients from Africa, harbouring either *Schistosoma mansoni* or *S. haematobium* or both, proved by the recovery of living or of dead eggs, have been subjected to the schistosomal complement-fixation test (CFT). The results of the test have been correlated with the probable duration of the infections, and such factors as their geographical and racial origin, the presence of other helminth infections, and the viability of the ova recovered. The CFT was positive in all of 20 cases of *S. mansoni* and in all of 21 cases of *S. haematobium* infection of less than 3 years' duration; some of these patients were of African and some of European stock. In recently acquired infections, therefore, the CFT is a valuable diagnostic aid.

In cases of infection of more than 3 years' duration, however, the results became progressively more unreliable; over one-half of the patients with *S. mansoni* infections of more than 10 years' standing gave negative CFT. It is suggested that repeated cercarial reinfections result in "false negative" reactions; details of some cases supporting this hypothesis are cited. The CFT is of limited value in determining the true incidence of schistosomiasis in endemic areas in view of the occurrence of these "false negatives", whatever their explanation; "false positive" reactions are so rare as to be negligible.

Treatment of proved infections in patients giving positive CFT usually did not cause reversion of the results of the test over many months' or years' observation after apparent parasitic cure. Even when reversion does occur it does not necessarily imply parasitic cure, as reversion may occur spontaneously in the course of an untreated infection. Again, in some persons with negative CFT apparently successful treatment was followed by the development of a positive CFT. Two theories are tendered to account for this. Complement-fixation antibody may be absorbed by female worms and ova, and destruction of these with the survival of male worms (not unusual after apparently successful treatment) may explain the change to a positive CFT. Alternatively, female worms and ova possibly produce a factor inhibitory to complement-fixing antibody; on their destruction this disappears and so the CFT becomes positive. *A. R. D. Adams*

RODRIGUEZ-MOLINA, R., OLIVER-GONZÁLEZ, J. & SERRANO, Diana G. **Studies on Immunity to Bilharziasis mansoni: Evaluation of the Circumoval Precipitin Test.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1105–7.

Antibodies against the eggs of *Schistosoma mansoni* have been detected in the sera of human beings infected with this parasite [this *Bulletin,* 1956, v. 53, 1353] and precipitins are formed around the membrane when eggs and serum are incubated at 37°C. Sera in chronic cases of *Schistosoma mansoni* infection are more active than those in early infections, and this can help in the diagnosis

and prognosis of clinical *S. mansoni* infections. The circumoval precipitin reaction indicates infection when other methods of diagnosis have failed.

The circumoval reactions in 46 cases of *S. mansoni* infection were assessed in Puerto Rico, (1) to evaluate the reliability of the circumoval precipitin reaction as a diagnostic test; (2) to determine the results of treatment, along with other criteria currently in use, such as improvement in the clinical manifestations of the disease or the presence of living and dead ova in the stools and in tissue removed from one of the rectal valves. The technique used is described in detail.

A positive reaction was obtained in 43 out of the 46 cases (93·4%). The test was repeated in the 3 cases in which negative results were obtained and the reactions were again negative. All 3 patients giving a negative reaction were known to have had schistosomiasis for several years and had received repeated doses of stibophen (Fuadin). 2 of them showed dead ova both in their stools and in rectal tissue, while the third patient had living ova in the stools and rectal tissue. No explanation for the negative circumoval test can be put forward at present. *W. E. Kershaw*

Ishak, K. G., Legolvan, P. C., Salib, M., Sabour, M. & Nooman, Z. **Needle Biopsy of the Liver and Spleen in Schistosomiasis. A Histopathologic Study.** *Amer. J. Clin. Path.* 1959, Jan., v. 31, No. 1, 46–59, 16 figs. [34 refs.]

Although liver and spleen enlargements are common in schistosomiasis there are relatively few records of the results of needle or of surgical biopsy of the liver in this condition. Needle biopsies with the Vim-Silverman needle were done on the livers and some of the spleens of more than 360 patients in Egypt. 61 of these patients yielded schistosome eggs or granulomata, or both, on needle biopsy of the liver; from only 25 of the 61 (41·7%) were schistosome ova recovered in the stools or urine by routine laboratory examination. In 54 patients yielding schistosome eggs in the urine or stools needle biopsies of the livers showed characteristic (ova or granulomata) changes in 29 of the 54 (53·7%); there were suggestive or consistent changes (periportal inflammation or fibrosis, schistosomal pigment, focal necroses, and granulomata without eggs) in another 18. Diagnosis of the species of schistosome involved was possible by the examination of liver tissue in only a few cases (18%). Liver lesions in schistosomiasis are considered to be directly due to the parasites.

Successful needle biopsy of the spleen was achieved in 31 of the 61 patients referred to above. 27 of the 31 on histological examination showed diffuse fibrosis or fibrocongestive splenomegaly; only one patient showed fibrosis with numerous eggs in the spleen biopsy material. The degree of splenic fibrosis was similar in degree to that in the livers of 25 (83·3%) of these 31 patients. In 14 spleens (46·7%) there were phagocytosed schistosome pigment granules.

Dimmette [*Gastroenterology*, 1955, v. 29, 219] has pointed out that wedge biopsy of the liver reveals more than twice as many cases of schistosomiasis as does needle biopsy. That is because the lesions of this in the liver though scattered in distribution are small in size. The splenomegaly associated with liver schistosomiasis cannot be distinguished histologically from other fibrocongestive splemomegalies [this *Bulletin*, 1957, v. 54, 1202]; it is due to the portal hypertension and is not specific; the only specific feature of the spleen

biopsy is the presence of schistosome pigment. Splenic fibrosis is proportional to the liver fibrosis; it is the latter that determines the degree of dilatation of the splenic sinuses.

[This is a valuable paper; further details of the findings can profitably be sought in the original text by those interested.] *A. R. D. Adams*

ALVES, W. **The Distribution of *Schistosoma* Eggs in Human Tissues.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1092–7.

The value of some of the previous work on the distribution of schistosome eggs in liver tissue is vitiated by lack of care in the removal and transport of material, and fresh studies were made restricting the number of organs examined and taking as much care as possible to avoid contamination between different organs.

Specimens were taken from bodies of 200 Africans who had died in the Salisbury Native Hospital from various causes, without selection, except that new-born and very young infants were excluded. The specimens came from two sets of consecutive autopsies, and the patients were of all ages. The uterus and adnexa were removed from all the 70 female patients. All the organs from each of the 200 bodies were (usually for technical reasons) not examined.

Table 1

Distribution of Schistosome Eggs in Various Organs in 200 Bantus

Organ examined	No. of cases	H	H & M	H & M	Mt	M & Mt	Mt	NEGATIVE
Appendix	198	103	5	1	7	—	3	79
Bladder	198	146	8	2	5	—	2	35
Brain	150	40	2	—	4	—	—	104
Heart	30	—	—	—	—	—	—	30
Liver	200	80	25	1	20	1	2	71
Lung	193	99	7	—	7	—	—	80
Rectum	200	110	34	1	23	—	3	29
Spleen	200	52	1	—	3	—	—	144
Uterus and adnexa	70	40	4	—	1	—	—	25

H = eggs of *S. haematobium*
Mt = eggs of *S. mattheei* (possibly *S. bovis*)
M = eggs of *S. mansoni*

These results give an accurate picture of the wide distribution of schistosome eggs throughout the body, but they give no indication of the tissue damage. In Southern Rhodesia, light infections are common, and it is probable that gross damage is seldom produced by the disease.

"Studies by Gillet in the Belgian Congo have shown, however, that where initial infection is heavy, as in irrigation farming, the Bantu population at risk may suffer grave illness and disability. Many parts of Africa will soon be faced with much heavier cercarial attacks and a concomitant increase in the severity of the disease in all races, because the key to the development of much of east, central and southern Africa lies in a greatly increased provision and use of water. This prospect and the present very high infection rate make it important that a combined investigation should be undertaken to arrive, if possible, at an accurate evaluation of the effect of the disease on health. Such an investigation cannot be carried out in conjunction with multifarious routine

duties, and a full-time unit should include a physician, a pathologist well-versed in parasitology, a physiologist, and possibly also a psychologist. These workers should study uninfected and infected young Africans, and if a difference in health and performance can be demonstrated, they should then evaluate the effect of treatment on this difference. It is of great interest to note that accurate studies of this kind are now being carried out in the Union of South Africa under the aegis of the South African Council of Scientific and Industrial Research."

W. E. Kershaw

FARID, Z., GREER, J. W., ISHAK, K. G., EL NAGAH, A. M., LEGOLVAN, P. C. & MOUSA, A. H. **Chronic Pulmonary Schistosomiasis.** *Amer. Rev. Tuberculosis.* 1959, Feb., v. 79, No. 2, 119–33, 16 figs. [67 refs.]

Schistosome eggs reach the lungs *via* the circulation as emboli from parasitized veins of the bladder and bowel. They penetrate by necrosis the intima, media and adventitia of the pulmonary arterioles in which they lodge. A granuloma then forms around them; this later is invaded by fibroblasts which form a nodular scar. There are thus two lesions in the lungs: the vascular and the parenchymatous.

Repair of the arteriolar wall causes thickening and constriction which may be partial or complete. If these lesions are numerous and widespread a diffuse endarteritis obliterans results; the capacity of the pulmonary vascular bed is reduced and the pulmonary arterial pressure rises. The resultant dilatation of the pulmonary artery may become considerable; there is dilatation and hypertrophy of the right ventricle; there may be secondary arteriosclerosis of the pulmonary artery.

If there are many granulomata in the lung parenchyma, and this is unusual, there will be extensive parenchymal scarring. If actual worms are present in the lung these cause no reaction while alive; their death causes a panarteritis; there is then thrombosis and vascular occlusion, with pneumonic consolidation of the adjacent parenchyma.

15 Egyptian peasant patients with schistosomal cor pulmonale were studied in Cairo. All but 2 were males and their ages ranged from 17 to 45 years. The major complaints in every case were dyspnoea and palpitation. Other complaints, the physical signs, and the laboratory findings are listed in a comprehensive table. All but 2 of the patients had proven *Schistosoma mansoni* infections; 7 of them had *S. haematobium*. Common to all the patients were the physical findings characteristic of pulmonary hypertension. Electrocardiography gave a tracing indicative of right ventricular hypertrophy and strain in 13 patients; one of these also showed left ventricular hypertrophy. X-ray examinations revealed dilatation of the pulmonary artery and its main branches, with a characteristic downward pulsatile thrust of the right main pulmonary artery seen on screening. This latter is helpful in distinguishing schistosomal cor pulmonale from mitral stenosis or an atrial septal defect. There was some fine mottling in the lung parenchyma in some cases. Ova of either *S. mansoni* (4) or *S. haematobium* (1) were recovered from the sputa of 5 patients.

Thorough studies of pulmonary function and of the pulmonary haemodynamics were undertaken; the data are recorded in some detail. The broad conclusions from these are that right heart catheterization confirmed a raised

pulmonary arterial pressure; this is due to a diffuse endarteritis obliterans with great reduction in the pulmonary vascular bed; anoxia may play a secondary but minor part in raising the pulmonary pressure during exercise. There is no confirmation of a previous suggestion [this *Bulletin*, 1955, v. 52, 796] that increased vasomotor tone contributes to the pulmonary hypertension. In schistosomal cor pulmonale there is mild ventilatory insufficiency which is either obstructive or restrictive or both; there is no gross uneven ventilation of the lungs; and alveolo-capillary diffusion defects, if present at all, are slight.

[See also *ibid.*, 1958, v. 55, 780, 1137.] *A. R. D. Adams*

Minsky-Kravetz, B. Quelques aspects cliniques de la bilharziose intestinale en Martinique. [**Some Clinical Features of Intestinal Schistosomiasis in Martinique**] *Méd. Trop.* Marseilles. 1959, Jan.–Feb., v. 19, No. 1, 87–92.

The author has been impressed by the incidence of manifestations of Mansonian schistosomiasis outside the range of those quoted in the classical descriptions of the disease. 20% of 50 patients admitted to hospital with what ultimately turned out to be this condition presented themselves with clinical signs and symptoms not at all suggestive of schistosomiasis. Details of some of these cases are cited; in some of them the manifestations suggested a localized anaphylaxis, or cutaneous, pulmonary or cardiac lesions; the parasitic origin of the troubles was determined in some of them fortuitously solely as a result of systematic stool examinations. The diagnosis of Mansonian schistosomiasis is by no means easy in view of the protean manifestations of the disease, which should therefore be regarded as a generalized condition rather than a series of specific localized lesions. *A. R. D. Adams*

Mayat, M. G. H. **Ectopic Pregnancy in a Tube infested with Bilharzia.** *South African Med. J.* 1959, Mar. 14, v. 33, No. 11, 219–20, 2 figs.

"A case of ectopic pregnancy in a bilharzial-infested tube is presented. The pathology and diagnosis are discussed with a review of the literature."

Lourmet, J., Beytout, A., Beytout, D. & Jardin, C. Accidents consécutifs à un traitement stibié. Utilisation d'un chélateur. [**Repeated Reactions to Antimony Treatment. Administration of a Chelating Agent**] *Méd. Trop.* Marseilles. 1959, Jan.–Feb., v. 19, No. 1, 103–6, 1 chart.

Antimony poisoning is very rare in industry and criminology, but it is by no means so in the practice of tropical medicine. A European on developing vesical schistosomiasis in the French Sudan was treated with anthiomaline; after the 9th or 10th injection he developed giddiness, local pains and 2 large blisters on the buttocks. He recovered on leave in France, but after a month haematuria recurred when he was in a village in West Africa. He was re-treated with antimony (2 doses weekly). The 5th injection caused violent local and radiating pain which lasted for some hours. The following day after a game of tennis there was fever and very intense pain in the buttock; the fever continued for 6 days, the pulse was small and rapid, dyspnoea steadily increased with feelings of chest constriction and anxiety, and the buttock became very

painful, tender and swollen. A skin eruption spread from the buttock and became general; in spite of diuretic drugs there was marked oliguria with slight albuminuria. BAL treatment was deemed undesirable under these conditions.

Some crystalline sodium versenate [the di-sodium salt of ethylene diamine tetra-acetic acid (Versene)]—a chelating agent for heavy metals like antimony and bismuth—was available. In default of any alternative means of treatment it was decided to try this, though there was no knowledge of its previous employment in the treatment of antimony poisoning. On the morning of the 6th day of the acute poisoning sodium versenate (1 gm.) was given orally with 1 gm. of calcium glucoheptagluconate—with an appreciation of the dangers of hypocalcaemia. Within some minutes there was intense sweating, with immediate relief and a rapid fall in the temperature; the dose was repeated that evening with similar reactions, and the drugs were continued similarly for the next 4 days, during which the temperature remained lower. Cortancyl [delta cortisone] treatment (30 mgm. for 2 days, 20 mgm. for 2 days, and 10 mgm. for 4 days) was started on the 2nd day of the versenate treatment. By the 3rd day of versenate treatment diuresis was restored and the albuminuria had ceased. On the 8th day an abscess in the buttock was aspirated, and 3 days later it was incised and drained; the contents were sterile necrotic muscle tissue; subsequent healing was rapid. The skin lesions thereafter cleared, with desquamation of the affected areas; the patient became convalescent, but he had lost 6 kgm. in weight and his pulse rate remained high for a month.

The authors consider this to be a case of intolerance-intoxication due to antimony, the predominating feature being the intoxication. The relief was due to the active chelation by the sodium versenate, and also in part to its anti-allergic properties; the cortisone also contributed by modifying symptoms and lessening the fever. The end result was excellent; the ease of administration of the drugs and their absence of toxicity contrast with the inconvenience and pain associated with the traditional BAL treatment for antimony poisoning.

A. R. D. Adams

Friedheim, E. A. H. **Treatment of Bilharziasis with Antimony Dimercaptosuccinate.** [Correspondence.] *South African Med. J.* 1959, Jan. 24, v. 33, No. 4, 84.

In comment on the paper by Pitchford and Harrison [this *Bulletin,* 1959, v. 56, 319] reporting on the treatment of Africans suffering from schistosomiasis with TWSb, Friedheim points out that the severe side-reactions were confined to those treated intensively for 2 days. They were negligible in those treated less intensively. He also states that these authors' analysis of their own records of the treatment of *Schistosoma mansoni* infection is faulty; in fact the drug did give a significant therapeutic result, dependent on the dosage, and this was 80% at the highest dose level. *A. R. D. Adams*

Kloetzel, K. & Kloetzel, Judith. Considerações sôbre as parasitoses intestinais em Gameleira. [**Observations on Intestinal Parasitic Infections in Gameleira, Brazil**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, July, v. 15, No. 7, 458–61. [11 refs.]

The English summary appended to the paper is as follows:—

"Based upon 814 stool examinations made in the town of Gameleira,

Pernambuco State, the authors present the incidence of intestinal parasitosis, also discussing their importance seen from the point of view of a general practitioner. The authors stress the importance of schistosomiasis mansoni in medicine and epidemiology. The following comments are made: 1. Only once were eggs of S. mansoni found in 157 stool examinations in children up to 3 years of age. The authors are of the opinion that the eclosion test should be mandatory in any systematic investigation carried out in this age group. 2. The disease appears earlier in the male sex. 3. The highest incidence (90%) is found in the 10–15 old group. 4. The incidence thereafter remains between 62–69% up to the age of 50. 5. Beyond this age the incidence decreases. This fact deserves further studies. 6. While they are unable to tell if their data is statistically significant, the authors found that the incidence of schistosomiasis in families is close to the incidence in the population as a whole. 7. Only by the use of quantitative concepts can this disease be properly investigated. None of the methods in use up to now allows us to tell benign cases from advanced ones without reference to clinical data. Since the principal object for future studies will necessarily be the aetiopathogeny of the severe forms of schistosomiasis, some quantitative method, be it immunological, be it based upon the egg count will have to be introduced in parasitology."

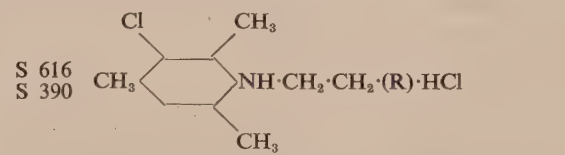
[See this *Bulletin,* 1959, v. 56, 65.]

FLOCH, H. & FAURAN, P. Présence de *Australorbis glabratus* (Say, 1818) en Guyane Française. [**Presence of *Australorbis glabratus* in French Guiana**] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini. Publication No. 441.* 1957, Dec., 8 pp. [18 refs.]

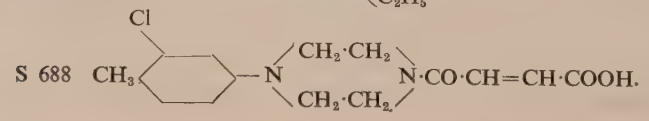
LÄMMLER, G. Beiträge zur experimentellen Schistosomiasis. I. Mitteilung. Untersuchungen zur Chemoprophylaxe der Bilharziose. [**Observations on Experimental Schistosomiasis. I. Studies on Chemoprophylaxis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 294–310, 6 figs. [Numerous refs.]

The author has briefly surveyed the literature on the methods used in the campaign against schistosome infection. They cover chemical attacks against the snail host, the use of impregnated clothing and ointments against cercarial infection and treatment of the infected host during the prepatent period, and the findings of earlier workers are quoted [this *Bulletin,* 1949, v. 46, 481 ; 1956, v. 53, 217].

In the present experiments the following three compounds were used in mice infected with *Schistosoma mansoni*:—



in which R=$N(C_2H_5)_2$ in S 616 and $N\langle^{H}_{C_2H_5}$ in S 390, and



in the search for effective prophylactic agents. Groups of 10 mice were infected and in accordance with the techniques of earlier workers for assessment of drug activity, the appearance of eggs in faeces, of worms in the venous system and the number of eggs in crush preparations of liver were determined. The Liberia strain of *Schistosoma mansoni* was used and the mouse host was infected with 200 cercariae subcutaneously. It was found that S 616 prevented infection when given for some hours before infection up to a few days after inoculation with cercariae. The schistosome larvae appeared very resistant between the 10th and 28th days after infection. The results of treatment of 20 groups of 10 mice at various times after infection with 0·8 mgm. drug per 20 gm. mouse by mouth are shown in a table. For other groups of mice the prophylactic action of the drug after a dose of 1 mgm. by mouth is also recorded. Similar data are given for compound S 688 at oral dosage of 1, 6 and 12 mgm. by mouth. The latter drug is not so effective as the former, possibly because it is more rapidly excreted by the mouse.

The question is touched upon whether the efficiency of a drug in schistosome infections depends on the state of maturity of the worm [see *ibid.*, 1949, v. 46, 481] or on the site in which it is harboured in the host. Compound S 390 mixed in concentrations of 1 to 2% in an ointment and smeared on mouse tails was found to prevent infection for some hours when the tails were exposed for 30 minutes to water heavily infected with cercariae. Compounds S 616 and S 688 are also effective against schistosomes during the early migratory period.

J. D. Fulton

Le, Wen-Ju, Yang, Jia-Yu & Shang, Yun-Cheng. **[Studies on the Experimental Therapy of Schistosomiasis japonica. XI. The Correlation between Concentration of Solution and Curative Effect of Potassium Antimonyl Tartrate]** *Acta Pharmaceutica Sinica.* 1959, v. 7, No. 1, 51–2. [In Chinese.]

The English summary appended to the paper is as follows:—

"In order to ascertain the correlation between schistosomicidal effect and the concentration of solution of potassium antimonyl tartrate, investigation was made in experimentally infected rabbits treated intravenously with the same dosage of potassium antimonyl tartrate in 3 different concentrations. The average number of worms recovered from groups of animals receiving 0·5%, 1% and 2% solutions was 26·9, 30·3 and 41·1 respectively while that from untreated animals was 104·0. It seems that the curative effect of potassium antimonyl tartrate is inversely related to the concentration of solution used."

Shimizu, M. **[Studies on the Cercaria Parasitic in *Semisulcospira libertina* in Tokushima Prefecture]** *Shikoku Acta Med.* 1958, Nov., v. 13, No. 5, 626–46, 2 text figs. & 33 figs. on 6 pls. [48 refs.] [In Japanese.] English summary.

The distribution of *Paragonimus westermani* cercariae has been little studied in Tokushima Prefecture, Japan, up till now. Between May 1955 and June 1957 the author, from the School of Medicine, Tokushima University, examined 11,617 specimens of *Semisulcospira libertina,* a freshwater snail which is the

first intermediate host of *P. westermani*. 27 (0·23%) of the specimens were infected by cercariae of *P. westermani* and a table showing the distribution makes it clear that the infection was much commoner in the middle and lower basins of the River Naka than in the rivers Katsuura and Akui which flow through the central parts of the prefecture.

16 other species of cercariae, 9 of which are new, were also found in *S. libertina* and these are listed. The results are shown in great detail in 2 maps and 9 tables in English in the Japanese text. *H. J. O'D. Burke-Gaffney*

THIELE, H. G. Lungenparagonimiasis. [**Paragonimiasis of the Lung**] *Deut. med. Woch.* 1959, Apr. 10, v. 84, No. 15, 747, 752–6, 775–6, 2 figs. on pl. [17 refs.]

A general account, with report of a case in a Chinese seaman, seen in Hamburg.

BUCK, A. A., SADUN, E. H., LIESKE, H., LEE, Bok-Ki & HAAGE, H. Zur Differentialdiagnose von Lungentuberkulose und Paragonimiasis durch die Einbeziehung immundiagnostischer Methoden. [**Differential Diagnosis between Pulmonary Tuberculosis and Paragonimiasis by Immunological Methods**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 328–34, 3 figs. [11 refs.]

These observations were carried out in Korea on 128 patients undergoing specific treatment for tuberculosis who were subjected to specific intradermal tests with trematode antigens and 102 others with radiographically normal lungs who acted as controls. The intradermal tests were made with antigens of *Paragonimus westermani* and *Clonorchis sinensis*.

The percentage giving a positive reaction in both groups was approximately the same with the latter antigen. With *Paragonimus* antigen they were different. 8% of the tuberculosis patients (10 in number) were positive as compared with only 1% of those showing no symptoms of pulmonary tuberculosis. Furthermore *Paragonimus* eggs could be detected in 50% of subjects responding to the *Paragonimus* antigen test. In 2 subjects the diagnosis of pulmonary tuberculosis proved incorrect but the remaining 3 were proved to be suffering from open pulmonary tuberculosis as well as from paragonimiasis.

Philip Manson-Bahr

BUCK, A. A., SADUN, E. H., LIESKE, H. & LEE, Bok-Ki. Zur Chloroquinetherapie der Paragonimiasis. [**Chloroquine Treatment of Paragonimiasis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 310–27, 6 figs. [18 refs.]

Working in Korea the authors treated 116 patients, 69 of whom had lung paragonimiasis, 24 extra-pulmonary or generalized paragonimiasis and a further series with lung paragonimiasis who had to be treated as ambulants.

All without reference to age received during the first 20 days of treatment an ampoule of chloroquine disphosphate (resochin), 0·25 gm. intramuscularly,

and aerosol inhalations at daily intervals. Patients over 15 years took a further tablet of 0·25 gm. by the mouth from the 11th day onwards. In patients with *Paragonimus* pleuritis the drug was given intrapleurally. The effect of this treatment was controlled by systematic examination of the sputum as well as by X-rays. It was shown that only those patients who showed definite improvement after doses of chloroquine not exceeding 40 mgm. would respond to further treatment.

It is claimed that permanent cures could be achieved by total doses of 40–120 gm. The criterion of cure adopted was no eggs of *Paragonimus* detectable in stool and sputum for a period of 6 months. Larger doses than those recorded above are not advised.

Though only 12·5% could be cured by resochin treatment, this drug must be regarded as a valuable agent for fresh infections with *Paragonimus westermani*. Advanced infections are much more difficult to cure as the cyst walls have become so thick as to resist penetration by this drug. *Philip Manson-Bahr*

Ishii, Y. & Ikejiri, M. [**A Case of the Scrotal Tumor caused by Larval Form of** *Diphyllobothrium mansoni*] *Igaku Kenkyu*. Fukuoka. 1959, Jan., v. 29, No. 1, 156–9, 3 figs. [29 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"A migratory tumor and other minor disorders of the testicles in a 17-year-old boy were cured with the removal of a larval tapeworm from the wall of the testicles which was measured 4·5 mm long and 0·7 mm broad in a fixed specimen and identified as Diphyllobothrium mansoni.

"This disease, though investigated experimentally and described in many cases, is not often met with. It is a disease of rare occurrence in Kyushu, according to the relevant literature, and yet it is comparable with gnathostomiasis and paragonimiasis in its clinical importance."

Osimani, J. J. Infecciones múltiples por las tenias llamadas "solitarias". A proposito de un caso con 9 ejemplares de *Taenia solium*. [**Multiple Infections of the so-called "Solitary" Tapeworms**] *An. Facul. de Med. Montevideo*. 1958, Sept.–Oct.–Nov.–Dec., v. 43, Nos. 5/6, 223–8, 4 figs. [14 refs.] English summary.

A case from Portugal.

Schneider, J. Traitement du taeniasis par le 5-5′-dichloro-2,2′-dihydroxy-diphénylméthane. [**Treatment of Taeniasis with 5-5′-dichloro-2,2′-dihydroxydiphenylmethane**] Reprinted from *Thérapie*. 1959, v. 14, 63–7.

The English summary appended to the paper is as follows:—

"For the last eighteen months we have treated 92 patients, carriers of *Taenia*, 86 of whom had *T. saginata* and 6 *T. solium*, with a new medicine the 5,5′-dichloro-2,2′-dihydroxydiphenylmethane or *dichlorophen*.

"In the six cases of *T. solium*, the cure was obtained definitively in one treatment course.

" For the cases of *T. saginata,* the proportion of successes, checked with a period of more than 4 months between, was 77·4% for patients who had not yet been treated for a taenia and 60% for patients in whom taenia had withstood the usual therapeutics (male fern, tin salts, acridin salts).

" The conclusion of that preliminary study is that the dichlorophen is a well-tolerated medicine and, when administered in a 6-gram dose daily, for two days and 3 grams the third day, can be considered as one of the best present-day therapeutics for taeniasis."

FOSTER, F. H. **Hydatid Disease in New Zealand.** *New Zealand Med. J.* 1958, Dec., v. 57, No. 322, 562–71, 2 graphs.

The incidence of hydatid disease in New Zealand is probably higher than anywhere else in the world. This paper reports the data concerning the patients admitted to public hospitals for the first time for treatment of hydatid disease during the period 1946 to 1956. The results are tabulated and given in so much detail that some general findings only can be noted here. The annual number of cases varied between 62 and 103, males being more commonly infected than females. The age distribution is interesting in that roughly 1 patient in 6 was under 10 years of age and 7 patients were aged under 2 years. The liver was the site of infection in 47·8% of the 902 patients and the lung in 36·5%. The next commonest site was the abdominal wall (3%). Annual age-specific rates calculated for liver and lung cases showed that the liver was more commonly involved in the older patients and the lung in the younger. Admission to hospital occurred once only in some 70% of cases, twice in 19%, 3 times in 7% and 4 or more times in 5%, and the average stay in hospital was 55 days. Lung infections appear to require more hospital attention than liver infections. The ratio of deaths to new cases, 16·3%, does not seem to have altered in 30 years. Maori males were infected 6 times as often as European males and Maori females 4 times as often as European females. It is surprising to find that the annual infection rate per 100,000 is highest in forestry and allied workers, followed by spinners and weavers and by labourers. Only about one-half the cases were notified and in some districts less than 20%.

T. H. Davey

STERMAN, M. M. & BROWN, H. W. *Echinococcus* **in Man and Dog in the same Household in New York City.** *J. Amer. Med. Ass.* 1959, Feb. 28, v. 169, No. 9, 938–40, 1 fig.

" Echinococcus cysts were removed surgically from a woman and her son residing in New York City in whose household lived a dog infected with the adult Echinococcus granulosus. The dog had been imported from Greece."

LUBINSKY, G. *Echinococcus granulosus* **in Domestic Animals in Western Pakistan.** *Canadian J. Zool.* 1959, Feb., v. 37, No. 1, 83.

In the latter half of 1953 the author, who writes from McGill University, Quebec, visited an abattoir in Rawalpindi, Pakistan, on 14 occasions in the

course of a parasitological study. Hydatid cysts were found in carcasses as follows:—

5 in 237 Jamnapari goats
3 in 65 sheep
4 in 26 cattle
1 in a water buffalo.

Most of the cysts were unilocular, but multilocular cysts were found in 2 cows. From the lungs and liver of the buffalo " more than two full buckets " of cysts up to 4 inches in diameter were removed.

Adult *Echinococcus granulosus* were found in the intestines of 2 of 11 stray dogs shot in Rawalpindi during the same year.

In most of the Pakistan abattoirs, especially in the rural areas, offal is disposed by dumping it outside the abattoir. Slaughtering is usually carried out after dark when scavenger birds are not active and the offal is consumed for the most part by stray dogs, jackals and hyaenas, which serve as potential reservoirs to wild life and human beings in whom hydatid cysts are not uncommon. Control could be effected readily by proper disposal of offal or by preventing access to it by dogs or wild carnivores.

H. J. O'D. Burke-Gaffney

SUSANNA, L. L'anchilostomiasi nella provincia di Ascoli Piceno e piano di bonifica. [**Ankylostomiasis within Ascoli Piceno Province. A Sanitation Programme**] *Ann. d. San. Pubblica.* Rome. 1958, Nov.–Dec., v. 19, No. 6, 1149–60, 3 figs. [15 refs.]

The English summary appended to the paper is as follows:—

" After outlining the general paths of ankylostomiasis spreading within Ascoli Piceno province, the author reports the results of an epidemiological investigation carefully conducted in an area ranging over 247 hectares. Coprological examinations, which the total population of the area was submitted to, resulted in a positivity of 30·5 p. cent.

" Furthermore the author reports the results of a survey concerned with sanitary, social-economical and working conditions of this population in relation to the spreading out of ankylostomiasis.

" To conclude, the author suggests some prophylactic measures to be adopted in order to control the infestation we are referring to."

OYTUN, H. S. & GÜRALP, N. **Taxonomic Research on the Etiology of Hookworm Disease occurring on the Shores of the Black Sea, Turkey.** [Miscellanea.] *Acta Tropica.* Basle. 1959, v. 16, No. 1, 76–7. [22 refs.]

" A taxonomic survey has been made on the hookworms collected from the infected patients on the Black sea shores of Turkey and diagnosed as *Necator americanus* and *Ancylostoma duodenale*. *N. americanus* is much more prevalent than *A. duodenale* [the figures are 95·8% and 4·2%, respectively, of 1,869 worms]."

See also p. 761, LARIZZA & VENTURA, **Recent Advances in Pathogenesis of Hookworm Anaemia.**

YOUNG, M. D., JEFFERY, G. M., FREED, J. E. & MOREHOUSE, W. G. **Bephenium, a New Drug Active against Human Hookworm.** *J. Parasitology.* 1958, Dec., v. 44, No. 6, 611–12.

Infections with *Necator americanus* are a severe problem in mental patients, and drugs commonly used against these worms give poor results in such patients. COPP *et al.* (*Nature,* 1958, v. 181, 183) reported that bephenium salts (salts of 2-phenoxyethylammonium) are active against some nematodes in the food canals of mammals, and BURROWS (*J. Parasitology,* 1958, v. 44, 607) obtained 99·4% clearance of *Ancylostoma caninum* in dogs and cats with single doses of these salts greater than 20 mgm./kgm., though 20 mgm./kgm. or less produced results almost as good.

The authors used N-benzyl-N,N-dimethyl-N-2-phenoxyethylammonium chloride supplied by Burroughs Wellcome as B.W.300C55 and they give the pharmacological information supplied by the makers of the drug. They decided to try a dose of 20 mgm./kgm. given orally. This was given to white female patients in a mental hospital who had moderate to heavy hookworm infections. No premedication was given; the average weight of the patients was 55 kgm. (121 lb.). Bephenium chloride was given in capsules each containing 400 mgm. "The base was 88·03% of the salt." A single "1·2-g dose of the salt, equivalent to 1·056 g of base", was given before breakfast on either 1 or 5 days. The drug was acceptable to the patients and there was neither nausea, vomiting nor toxic effects. This single dose given to 14 patients removed about half the hookworms as determined 3 and 15 weeks after treatment by egg counts done by the Stoll method. Thus better results were obtained than with other drugs commonly used.

The authors also gave 6 gm. (5·280 gm. of the base) spread over 5 days (1·056 gm. per day) to 6 patients; examinations done twice a week for 4 weeks after treatment and again 15 weeks after treatment showed that 79% of the worms had been removed.

Trichuris trichiura was present in 14 patients given the single dose of 1·056 gm., and 15 weeks later it was found that all the worms had been removed from 1 patient and that, in the others, the overall reduction in the egg count was 14%.

The authors think that this drug shows promise of being more effective against hookworms than other drugs commonly used, and they propose to try other salts of the compound and other regimens. *G. Lapage*

CORITSOGLOU, A. C. [**Case Report of Strongyloidosis**] *Acta Microbiologica Hellenica.* Athens. 1958, Nov.–Dec., v. 3, No. 6, 256–60. [12 refs.] [In Greek.]

The English summary appended to the paper is as follows:—

"A case of strongyloidosis of a man 58 years old, from Kallithea—Athens, is reported.

"Seven cases of strongyloidosis are reported until now by different authors on individuals who had never gone out of Greece and coming from different parts of the country. They all were observed during the last decade. This suggests that *Strongyloides stercoralis* was introduced in Greece after World War II, by carriers probably belonging to the allied armies, which previously

stayed for a long time in tropical endemic areas. It is probable that in some parts of this country, this worm found favorable environmental conditions for its free-living generation, so that endemical foci started to be created."

AMATO NETO, V., CORRÊA, M. O. A. & CORRÊA FLEURY, Gilda. Estudo sôbre o valor do método de Rugai, Mattos e Brisola na pesquisa de larvas de nematóides nas fezes. [**Value of the Method of Rugai *et al.* for the Detection of Nematode Larvae in Faeces**] *Rev. Inst. Adolfo Lutz.* S. Paulo. 1957, v. 17, 33–8.

The English summary appended to the paper is as follows:—

"One hundred and seventy feces specimens from patients under controlled treatment for strongyloidosis were tested by Baermann's method as modified by COUTINHO, CAMPOS and AMATO NETO (1951) as well as by the method of RUGAI, MATTOS and BRISOLA [this *Bulletin*, 1955, v. 52, 805]. One hundred and twelve specimens were positive for larvae of *Strongyloides stercoralis* by both methods; 47 specimens were negative by both methods; 8 were positive only by the modified Baermann's method and 3 were positive only by Rugai *et al.'s* method. The latter method was simpler and more economic and hygienic. The difference between the results of both methods is not statistically significant.

"When specimens were positive only by one method, the number of larvae was very small."

PATEL, T. B. & PARANJPEY, P. D. **Observations on Mass Therapy with Diethylcarbamazine (Hetrazan) for Filaria Control in Bombay State.** *Indian J. Malariology.* 1958, Sept., v. 12, No. 3, 171–82.

Filariasis (*Wuchereria bancrofti*) forms a very important public health problem in certain areas in Bombay State where about four million people are at risk. Under the National Filaria Control Programme 4 Filaria Control units are functioning in Bombay State, one each at Nagpur and Surat and two in Saurashtra region. Each one of these units protects about 300,000 people.

A systematic survey to determine the incidence of filariasis was carried out in Surat in 1950–51 when it was found that 12% of the population showed evidence of infection. The municipality was advised to undertake anti-larval measures and anti-adult measures by indoor residual spraying with DDT. The results of these measures were not encouraging, except in children in the age-group of 5 to 9 years who may have received a fair amount of protection from primary infection so that there was a significant fall in the infection rate from 8·8 in 1951 to 5·5 in 1956–57. Mass diethylcarbamazine therapy was carried out during the period from September 24, 1956, to January 31, 1957, but the number of persons who availed themselves of this therapy was 73,139 (or only about 32·7%). Notes are given also on the Nagpur and Saurashtra units.

Mass therapy with diethylcarbamazine cannot be relied upon as a single method for complete control so that a combination of all the three methods of control, *viz.*, anti-adult, anti-larval and anti-parasitic, is essential for effective control. This drug appears to have very little effect upon the established

disease which tends to make the public non-appreciative of this measure and consequently they become non-cooperative. The results for the 3 areas can be expressed in the following table:—

Unit	Population	No. taking drug	Percentage to total population	No. taking complete course	Percentage to total population
Nagpur	283,237	158,400	55·9	60,061	21·2
Surat	223,832	73,139	32·7	30,065	13·4
Saurashtra	113,763	60,447	53·0	35,743	31·4

Experience showed a better response to this measure in rural and semi-urban areas than in urban areas as the population is mainly dependent on agriculture and the occurrence of reactions does not deter them from taking the drug. In a large number of cases these reactions were of a mild and transitory nature. The dosage schedule was as follows, each dose representing a tablet of diethylcarbamazine of 100 mgm.

I. (adults)	A single dose of 2 tablets for 5 days
II. (12–18 years)	A single dose of one and a half tablets for 5 days
III. (6–12 years)	A single dose of one tablet for 5 days
IV. (2–6 years)	A single dose of half a tablet for 5 days

Mass diethylcarbamazine therapy has the added advantage that it clears the community of the ubiquitous roundworm infection as well.

A limited observation was made on the number of microfilariae in the blood in 70 persons in Surat. The average microfilaria content per 20 cmm. of blood before therapy was 18·4. After a complete course blood samples taken 3 to 4 months subsequently showed an average infection rate of 3·7, and 27 (38·3%) out of 70 showed complete clearance.

In the Nagpur unit the average infection rate for 97 persons was 38·1 before the therapy; 2 months afterwards the average rate had dropped to 9 showing a reduction of 76%. Complete clearance was shown in 17 people.

The claim that diethylcarbamazine causes a great reduction of microfilarial density by its remarkably rapid action in destroying the microfilariae is thus substantiated, but it cannot be regarded as an absolutely safe method on account of its side-effects. On an average, these reactions are less severe in children than in adults. The mass diethylcarbamazine therapy scheme covered a population of 620,832 in Bombay State and out of 291,986 persons who took the drug 29% complained of various reactions.

The results of this study are shown in detail in 8 tables.

Philip Manson-Bahr

YOUNG, M. D., JEFFERY, G. M., FREED, J. E. & MOREHOUSE, W. G. **Effectiveness of Dithiazanine against Worm Infections of Mental Patients.** Reprinted from *Arch. Neurology & Psychiatry*. 1958, Dec., v. 80, 785–7.

Encouraged by results obtained by FRYE *et al.* [this *Bulletin*, 1958, v. 55, 436] and by SWARTZWELDER *et al.* [*ibid.*, 1958, v. 55, 530] the authors treated

27 white women patients in a mental hospital with dithiazanine iodide (Delvex) given in 100 mgm. enteric-coated tablets in doses of 200 mgm. 4 times daily for 5 days after meals and at bedtime. The dose at bedtime was given with milk or other food. The average weight of the patients was about 54 kgm. (120 lb.). Infections with *Trichuris* and "hookworm" [species not stated] were determined by direct saline and iodine faecal smears and $ZnSO_4$ centrifugal flotation; their intensity was determined by Stoll egg counts done on 2 stools from each patient during the week before treatment and on stools one and 3 weeks after it, 2 counts being done each week.

Of the 27 patients, 23 were infected with *Trichuris,* the egg counts varying between 400 and 276,300 eggs per gm. The drug reduced the egg counts by 83% to 100% one week after treatment and by 54% to 100% 3 weeks after it. One week after treatment 14 patients (61%) had no eggs, the reduction in the total egg count being 96%. 3 weeks after treatment 18 patients (76%) were free from eggs and the reduction in the total egg count was 99%. 6 patients lightly positive one week after treatment were negative in the third week. 2 patients negative one week after treatment had, in the third week, very few eggs (100 and 300 per cc.). As 100 eggs is the smallest number ordinarily detectable by the Stoll method, this means that these patients could also have been positive during the first week after treatment, an occasional egg not having been found. That so few eggs were found in the third week does not necessarily mean a return of egg-laying after its suppression in the first week after treatment.

"Hookworm" was present in all the 27 patients and none of the infections with these worms was eliminated; but 7 patients showed reductions of about 80% of the egg count by the end of the third week after treatment; one week after treatment the reduction in the total egg count was 50% and after 3 weeks it was 40%. In 10 patients "the egg counts were larger than or remained the same as those prior to treatment at the end of the first week (2 patients), or the third week (four patients), or both (four patients)".

11 patients showed mild or transient vomiting during treatment, but it was not necessary to stop treatment and significant amounts of the drug were not thus lost. Twice a blue-tinged vomit was noticed and the stools were uniformly coloured blue. 1 patient had nausea without vomiting and 2 had mild diarrhoea.

The authors think that the results confirm those obtained in *Trichuris* infections by Frye *et al.* [*loc. cit.*] and that the drug seems to be very effective against the heavy *Trichuris* infections found in some mental patients; they also confirm the moderate effect on hookworms reported by Swartzwelder *et al.* [*loc. cit.*]. The dose given (800 mgm. a day) by the present authors was higher than that given by Frye *et al.* [*loc. cit.*] (600 mgm. a day), but this had little added effect. In 6 patients one week after treatment the egg counts increased from 100 to 3,600 eggs per gm., and in 6 patients 3 weeks after treatment they rose from 200 to 7,400 eggs per gm. This, together with the rather higher reduction in the egg count one week after treatment than 3 weeks after it, suggests that the drug caused only temporary suppression of the egg production or even, in some instances, an increase of it. But study of untreated controls and the "time of year" made it quite certain that the worm burden did not increase during the period of treatment. *G. Lapage*

Popovic, B., Sretenovic, B. & Velickovic, C. [**Trichinosis in the Environs of Kraljevo and Ivanjica**] *Bull. Inst. Hyg.* Belgrade. 1958, v. 7, Nos. 3/4, 29–34. [In Serbian.]

The English summary appended to the paper is as follows:—

"In the environs of Kraljevo two epidemics of trichinosis in 1954 and one epidemic of trichinosis in 1957 were registered. At the beginning of 1958 one epidemic of trichinosis was registered in the environs of Ivanjica. In these four epidemics 51 persons were affected: 14 with severe, 16 with moderate and 21 with slight symptoms.

"All epidemics occurred in mountain regions. All patients were infected by the consumption of uncooked cured meat deriving from sows older than $2\frac{1}{2}$ years. The sows were home bred, fed in villages and in forests where they probably were infected by eating wild carnivore rodents.

"For the investigation of dry pork by the trichinoscope it is necessary to select proper pieces of meat and to prepare them correctly. In the preparation of cured meat for examination, pieces of meat should be soaked in water containing 100 units of penicillin and 100 units of streptomycin in 1 ml. The meat prepared in this manner is kept in waterbath at 56° C at least 5 hours.

"A great number of diagnosed cases of trichinosis in human as well as the permanent occurrence every year points out that this disease is probably more widespread than has been considered. If the symptoms are slight, the disease is not recognized and it is mistaken with other diseases."

Pascu, Alexandrina, Ionescu, I., Sileanu, Lucia & Dimulescu, C. O epidemie de 24 de cazuri de trichinoză. [**An Epidemic of 24 Cases of Trichiniasis**] *Microbiol., Parazitol. si Epidemiol.* Bucharest. 1958, May–June, v. 3, No. 3, 273–8. [17 refs.]

An account is given of an outbreak of trichiniasis with 24 cases which occurred in Rumania in 1955 as a result of eating the meat of 2 pigs which were apparently healthy at the time of slaughter, but which were found to be massively infected with *Trichinella spiralis* in subsequent investigations. The incubation period ranged from 7 to 24 days with a mean of 16 days. Fever was present in 77·3% of patients, lasting for 10–60 days (mean 32 days), and was accompanied by profuse sweating; respiratory embarrassment was observed in 20·4%, oedema in 58% and insomnia in 37·5% of patients. 2 patients developed a very severe form of the disease, 1 of whom died; 12 suffered from a severe form, 7 from an abortive form and in 3 the disease was asymptomatic. Eosinophilia up to 68% was observed. *D. J. Bauer*

Agosin, M. & Aravena, Luisa C. **Anaerobic Glycolysis in Homogenates of *Trichinella spiralis* Larvae.** *Exper. Parasit.* New York. 1959, Feb., v. 8, No. 1, 10–30, 8 figs. [43 refs.]

DEFICIENCY DISEASES

NICOL, B. M. **Fertility and Food in Northern Nigeria.** *West African Med. J.* 1959, Feb., v. 8 (n.s.), No. 1, 18–27.

During clinical and food consumption surveys carried on between 1954 and 1958 in 6 rural areas of Northern Nigeria demographic data were obtained at interviews. The figures were studied to see whether the 2% rate of increase indicated by census returns was probable, and to assess the effects of various food patterns and nutrient intakes on fertility. The small communities investigated were at least 50 miles from a town and 15 miles from a main road or railway. 594 persons were studied on 2 or 3 occasions during a year and the food consumption of a significant proportion of them was measured. Tables show the age and sex distribution of those investigated, the demographic data and the average daily nutrient intake.

The demographic indices estimated were: gross (2·57) and net (1·37) reproduction rates; crude annual birth rate, 56/1,000; fertility rate, 205/1,000 women of child-bearing age; infant mortality rate, 292/1,000 live births; the 1–4-year mortality rate, 97/1,000 live births; total maternity rate, 5 births to women over 50 years of age. The results varied considerably with the area, but the mean values indicated that the rural population is increasing in spite of the heavy child mortality. The estimated nutrient intakes of the women concerned in the survey varied, according to area, from 1,520 to 2,650 calories. The usual intake is probably over 2,000 calories with over 60 gm. protein. The demographic data obtained were comparable with the census data and *vice versa*. Two of the areas, with net reproduction rates of 1·0 and 0·8, were probably in a static or declining state, in one case probably as a result of overselling food crops to the detriment of the diet which was 1,700 calories, and in the other due to community-wide syphilis. It was impossible to correlate the nutritive value of diet with reproductive performance, but there were indications that poor diets, *e.g.*, when yam was the staple food, had an adverse effect on reproduction. The correlation of malnutrition with a high ratio of death rate in the 1–4-year group to death rate in the 0–1-year group could not be shown because the food consumption of children below 4 years could not be measured accurately. *T. H. Davey*

FERRO-LUZZI, A. Studio clinico sullo stato di nutrizione di una comunità suburbana della Tripolitania. [**The Nutritional State of a Tripolitanian Suburban Community**] Reprinted from *Rass. Italiana Gastro-Enterologia.* 1958, Oct., No. 10, 17 pp., 3 graphs. [10 refs.] English summary (6 lines).

The author examined clinically infants, pre-school and school-age children, and adults at Suk el Giuma in Libya to try and assess their nutritional state.

172 children under 5 years old were examined, weight curves were constructed and compared with those of an American community and with the average for Italian infants. The results showed that the curves ran parallel for the first 3 months, but from then on the Libyan curve was lower than the other two, so that a 1-year-old child only corresponded in weight with a 6-month-old American baby, and an 8-month-old Italian baby. At 18 months the Libyan child only equalled the weight of an 8-month-old American baby, and a 10-

month-old Italian baby. By the age of 5 years the Libyan curve had approximated to the Italian but not to the American curve.

Signs of malnutrition are frequent in Libyan children in the first 2 to 3 years of life. The usual symptoms are vomiting and diarrhoea, with dehydration, pallor, loss of weight, constant anorexia; signs affecting the skin were only rarely seen. Active rickets was common but no case of kwashiorkor was found. Infant mortality rates are estimated to be between 350–400‰ up to the second year.

The malnutrition is considered to be due to the frequent occurrence of serious gastroenteritis, and the age at which this and loss of weight are most often seen corresponds with weaning. Bad hygiene conditions and lack of education of the mothers are contributing factors. After the second year malnutrition is due to scarcity of food; the large amount of rickets seen is considered to be a result of the very limited exposure to the sun which is an important feature of the life of Arab babies in the first year.

187 schoolchildren between the ages of 6 and 17 years were examined, heights and weights were noted, and measurement made of the skin thickness of the arm, and at the subscapular angle.

Nutrition was good in 70·7%, moderate in 28·2%, poor in only 1·1%. The most common sign of malnutrition was cheilosis; dental caries was found in 26% and malposition of 2 or more teeth in 12·2%. Comparing the height and weight curves with those of Italian and American schoolchildren, the author found that the Libyan and Italian curves ran nearly parallel and both were below the American curve [the Italian figures refer to those reported by De Toni in 1939 (*Puericultura*. 1939. Torino: Ediz. Min. Med.)]. The cheilosis may be due to low consumption of vitamin B2, while the dental caries and malposition are probably connected with previous rickets. Pot-belly, which was often seen in children up to 11 years old, is probably caused by the primarily vegetarian diet.

150 adults were examined. Anaemia was the most frequent symptom, and was possibly due to hookworm. Other signs were xerosis, atrophy of the lingual mucosa and cheilosis. Active pulmonary tuberculosis was quite common and the nutritional state of pregnant women was only moderate, but on the whole the condition of the adults was not unsatisfactory.

The author's conclusions are as follows:—(1) the malnutrition found in infants at Suk el Giuma is due to gastroenteritis, while rickets is frequent; (2) signs of calorie deficiency in pre-school children are common; (3) the nutrition of schoolchildren is reasonably satisfactory, though there is a high incidence of dental caries and malposition, and cheilosis; (4) among most of the Arabs in the area malnutrition is not common except among the very poorest, but pulmonary tuberculosis is frequent. *W. K. Dunscombe*

De Oliveira, N. M. Considerações sôbre um inquérito de avaliação do estado nutritivo em 5469 escolares do D. Federal, realizado em 1952. [**Observations on a Nutritional Survey of 5,469 Schoolchildren in Rio de Janeiro, Brazil, in 1952**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, May, v. 15, No. 5, 312–15.

The English summary appended to the paper is as follows:—

"Endeavouring to find one adequate nutritious lunch for school children in

Rio de Janeiro, one ample investigation was made among 6,000 students in all scholar districts of the city. A relatively great incidence of dental caries, hypovitaminosis, etc., was statistically verified, all showing the need of better alimentary policy by the authorities."

Costa, D. & De Hollanda, Hortênsia H. Economia e alimentação no Nordeste, em áreas de esquistossomose. Dados de um inquérito em dois bairros populares de João Pessoa. [**Economy and Nutrition in Areas of Schistosomiasis in North-East Brazil. Survey in Two Areas in Joao Pessoa**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, Oct., v. 15, No. 10, 708–14.

The English summary appended to the paper is as follows:—

"The authors made a survey among 230 families of workers in the city João Pessoa, state of Paraíba, concerning the incomes, the expenses with food, food habits, and other aspects. In some families (10%) the expense with food comprised the totality of the incomes. The nutritional condition of the workers in João Pessoa was altogether very bad."

See also p. 760, Crotty, **Anaemia and Nutritional Disease in Northern Territory Native Children.**

Holemans, K. & Lambrechts, A., with the technical assistance of H. Martin. **Calcium and Phosphorus Metabolism in Malnutrition and in Kwashiorkor.** *J. Trop. Pediatrics.* London. 1959, Mar., v. 4, No. 4, 129–32, 2 figs.

11 patients suffering from kwashiorkor and 8 with severe malnutrition were submitted to calcium phosphate balance studies. Though the minimum requirements of calcium and phosphorus were slightly higher than those the authors had established for normal controls in that region of Africa (Belgian Congo) [this *Bulletin,* 1959, v. 56, 473], the relation between intake and retention of calcium and phosphorus was about the same in the two groups. The actual figures were: 20 mgm. of calcium and 28 mgm. of phosphorus per kgm. per day for the patients, and a requirement of 12 mgm. calcium and 21 mgm. of phosphorus for the normal controls. *H. Lehmann*

Schendel, H. E. & Hansen, J. D. L. **Studies on Fat Metabolism in Kwashiorkor: I. Total Serum Cholesterol.** *Metabolism.* New York. 1958, Nov., v. 7, No. 6, 731–41, 3 figs. [41 refs.]

In a study of 48 infants suffering from kwashiorkor carried out in Cape Town, South Africa, it was found that the serum cholesterol was low at the beginning of treatment and rose significantly—sometimes by 100 mgm.% when the patient became better. If treatment was not successful, and the improvement arrested, the cholesterol fell again.

The authors discuss the possibility that the improvement is brought about by a regeneration of the enzyme which re-establishes normal fat transport, or that

it may be based on the cholesterol synthesis from acetate when the fat in the "fatty liver" becomes catabolized.

Another serum component which is closely coordinated with improvement is serum albumin, and it is of interest that the rise in cholesterol more accurately reflects favourable response to treatment than changes in the serum albumin level.

As regards the cholesterol data, it is clear that the actual level on admission is not related to the prognosis, and that the important finding is the cholesterol response. *H. Lehmann*

Béhar, M., Bressani, R. & Scrimshaw, N. S. El tratamiento y la prevención del síndrome pluricarencial de la infancia. [**Treatment and Prevention of Kwashiorkor**] *Bol. Oficina Sanitaria Panamericana.* 1959, Jan., Suppl. 3, 31–71, 5 figs. [182 refs.]

A general review and discussion.

Scrimshaw, N. S., Squibb, R. L., Bressani, R., Béhar, M., Viteri, F. & Arroyave, G. Mezclas de proteínas vegetales para la alimentación de niños lactantes y pre-escolares. [**Vegetable Protein Mixtures for the Nutrition of Lactating Infants and Pre-School Children**] *Bol. Oficina Sanitaria Panamericana.* 1959, Jan., Suppl. 3, 86–101, 3 figs. [33 refs.]

Politzer, W. M. **Acute Reversible Heart Failure: Correlation between the Thiamin Excretion Tests and Response to Treatment with Thiamin in the South African Bantu.** *South African J. Med. Sci.* 1958, Apr., v. 23, No. 1, 5–7.

"Thiamin excretion and saturation tests were carried out on seven control patients and on 13 patients with acute cardiac failure of whom 10 had been diagnosed as beri-beri.

"There was no correlation between the thiamin excretion and saturation tests and the response to treatment with thiamin in the beri-beri and other groups."

Losonczi, E. **Social Anthropology in Health Education with particular reference to Nutrition.** *West Indian Med. J.* 1958, Sept., v. 7, No. 3, 206–10.

In British Honduras levels of nutrition are low because food is either not produced, or is sold and not eaten by the producers, or cannot be transported. Attempts to introduce new foods proved unsuccessful regardless of the education or racial group of the people. This was probably connected with the almost religious attitude towards their staple food. The author points out that poor nutrition will not improve without health education which necessitates first learning the views of the people, then adapting the public health programme to conform with these and lastly popular teaching of public health. The first two stages are partly or wholly in the field of social anthropology. Interesting examples of local attitudes and adaptations of public health programmes are

drawn from experience in British Honduras. The necessary socio-anthropological studies should be made by nurses and it is proposed that they should be trained in the science of human behaviour. Suggestions are made regarding their training and the attitudes which will have to be learnt. Health education and nutritional precepts may upset the cultural pattern and cause worry or a rejection of the advice, but these can be avoided if traditional attitudes are studied first and the education adapted to suit.

[This is a stimulating and interesting paper.] *T. H. Davey*

HAEMATOLOGY

EDOZIEN, J. C. **Biochemical "Normals" in Nigerians: (I) Blood.** *West African Med. J.* 1958, Sept., v. 7 (n.s.), No. 3, 121–8, 1 fig. [27 refs.]

This is a most useful and extensive collection of normal physiological values in Nigeria. They have been elaborated in the Department of Chemical Pathology at University College, Ibadan. Most of the substances estimated were found to be of the same concentration in blood and plasma as those reported from other countries. However, differences exist in the normal values for serum protein, serum lipids, and for some of the protein lability tests. The zinc sulphate turbidity and the cephalin cholesterol flocculation units as well as the serum gamma globulin were higher than in normal Europeans. This is of some importance because the lability tests and serum globulin estimations are used as liver function tests.

It seems that in Nigeria an increase in serum gamma globulin concentration is found normally, and that this increase suffices to disturb the readings in the two lability tests which are specially designed to indicate a rise in that globulin fraction. The thymol turbidity test and the colloidal gold test were unaffected. The author thinks that the high gamma globulin is due to a true genetic difference between Africans and Europeans. The total lipids and the serum cholesterol were lower in Nigerians than in Europeans living in Ibadan. However, the proportion of esterified cholesterol was the same in both (65·5% and 65·8%, respectively). Within the Nigerian group there were differences related to income, and the highest income group showed roughly the same values for serum lipids, serum cholesterol, phospholipids and neutral fat as the European group. *H. Lehmann*

POWELL, S. J. **The Serum Protein Pattern and Liver Function Tests in the Natal African.** *South African J. Lab. & Clin. Med.* 1958, Dec., v. 4, No. 4, 273–82. [31 refs.]

Two groups of 50 African men, and a third group of 25 normal Europeans, were examined for their serum protein and liver functions. One of the African groups had been receiving an adequate European type of diet for at least 3 years, whereas the second African group were labourers and manual workers, who, though looking healthy and having no obvious signs of liver disease, ate

meat rarely more than once a week and had little other sources of animal protein in their diet.

There was no great difference in the haemoglobin levels of the three groups but the alkaline phosphatase and zinc sulphate turbidity as well as the cephalin cholesterol flocculation test gave lowest results in the European group and highest in the group of labourers. The group of Africans living on a European type of diet gave intermediate results. The albumin-globulin ratio was 1·2 in the Europeans, 1·1 in the group of Africans on the European type of diet, and 0·8 in the labourers. Electrophoresis showed a parallel increase in gamma globulin, and though the albumin was the same in the European group as in the group of Africans living on a European type of diet, it was considerably lowered in the group of African labourers.

The author suggests that the serum albumin level is directly related to the quality of food intake, but that the serum globulin changes were possibly related to other than nutritional factors, *i.e.*, incidence of infectious diseases and possibly racial differences. *H. Lehmann*

CROTTY, J. M. **Anaemia and Nutritional Disease in Northern Territory Native Children.** *Med. J. Australia.* 1958, Sept. 6, v. 2, No. 10, 322–5, 2 figs.

This study was undertaken in two parts: the first was an investigation of the incidence of anaemia and of the general state of nutrition among 424 children living within 150 miles of Darwin, Northern Australia; the second was a more detailed study of a group of severely anaemic children.

The mean haemoglobin values were arranged according to age-groups and in each were found to be between 2 and 3 gm. per 100 ml. lower than comparable values obtained from white children in New South Wales. The heights and weights of the children from the North Australian Territories were also lower than those of the children from New South Wales. Very little difference was found between the mean haemoglobin values of children who had and those who had not hookworm infection.

The condition of 28 children, whose ages ranged from 7 months to 6 years, was studied in detail. All were anaemic and their haemoglobin values ranged from 1·8 gm. to 7 gm. per 100 ml. blood. The marrow was examined in 25 patients and in 4 there was megaloblastic change. Liver enlargement was almost invariable. changes in the hair were seen in all the children and a crazy-pavement dermatosis was present in some. Oedema was present in 4 children, all of whom were underweight for their age; correction of the anaemia alone did not alter the oedema which, however, resolved after prolonged dietary treatment. Diarrhoea was prominent in only a few cases, and when it occurred "it was a sign of a prolonged illness". Evidence of hookworm infection was found in 25 of the 28 children.

The study indicated that in children, most of whom were aged between 1 and 5 years, there occurs in the Northern Territories of Australia an anaemia associated with skin and hair changes, large liver, "pot belly" and sometimes diarrhoea. The aetiology of the anaemia is only partly explained by iron lack. "The rest of the pattern would fit in with a protein lack as it resembles the picture in kwashiorkor. Consideration of the diet of these children, especially in the second year of life, shows that both iron deficiency and kwashiorkor could be expected." *A. W. Woodruff*

KHO LIEN-KENG & ODANG, O. **Megaloblastic Anemia in Infancy and Childhood in Djakarta.** *Amer. J. Dis. Children.* Chicago. 1959, Feb., v. 97, No. 2, 209–18, 12 figs. [20 refs.]

Examining marrow specimens from 800 Indonesian children, the authors found that 25 were megaloblastic; 5 were from sufferers from kwashiorkor [see also this *Bulletin,* 1957, v. 54, 992]. The ages of the patients ranged from 4 weeks to 6 years. Common aetiological factors were malnutrition, infections, prematurity, and "chronic dyspnoea", and practically all the patients showed loss of weight and appetite, diarrhoea, and fever. Achlorhydria was demonstrated in 1 only. The Hb varied from 1·5 to 9·0 gm. per 100 ml., the MCV from 90 to 112 cμ, and reticulocytes from 0·8 to 15·4%. The marrows were typically megaloblastic, as photographs show.

Treatment was designed to correct multiple deficiencies. Infections were treated, and multiple vitamin preparations administered, together with folic acid (alone or with vitamin B12). This always produced a reticulocytosis, but a full response was seldom obtained. Iron deficiency was often present, and for this oral iron was not well tolerated. The authors did not favour parenteral iron therapy, but preferred to give blood transfusions to correct this deficiency. They regard blood transfusion as an essential early measure for the most anaemic children. *Alan B. Raper*

LARIZZA, P. & VENTURA, S. **Recent Advances in Pathogenesis of Hookworm Anaemia.** *Scientia Med. Italica.* 1959, Jan.–Mar., v. 7, No. 3, 411–61, 11 figs. [74 refs.]

Hookworm infection is spreading in Umbria, where it is becoming of social importance. In explanation of the variable degree to which anaemia develops in infected persons, the authors refer to their previous contention that the most important consideration is the previous or the resultant state of the iron reserves. They quote additional support for this from their studies with radioactive iron, which may be eliminated in some non-anaemic carriers as rapidly as in some anaemic hookworm patients; they find no evidence for any toxic action of the parasite on the peripheral blood or bone marrow; and they find the biochemical aspects of hookworm anaemia to be identical with those of any pure sideropenic anaemia. In their Italian patients they cannot confirm that protein deficiency imposes any block on haemoglobin production, but they admit that this may occur in some tropical countries. *Alan B. Raper*

VYAS, K. J. **Intravenous Iron Therapy in Children.** *Indian J. Child Health.* 1958, Oct., v. 7, No. 10, 647–54, 3 graphs.

The therapeutic effects of intravenously administered iron were studied in 30 children suffering from anaemia, the type of which was not classified. It is stated, however, that all the patients were undernourished, that in 23 the probable aetiological factor was a chronic infection, in one it was hookworm infection, in one scurvy, in one hypothyroidism, in one nephrosis and in 3 early cirrhosis of the liver. Initially 10 mgm. of saccharated iron oxide were administered intravenously, injections were given daily and the amount

increased by 10 mgm. on every fourth or fifth day for a period which is not specified. An ounce of a powder containing 15 gm. protein was administered orally daily.

In 18 of the patients a rise in haemoglobin of more than 3·6 gm. per 100 ml. was obtained for every 100 mgm. of iron administered. In 25 patients there was a gain in weight of between 1 and 13 pounds during treatment. Toxic reactions occurred in 7 patients and these included venous thrombosis, abdominal pain, pyrexia, pain in the extremities, a feeling of suffocation, abdominal pain and in one patient pigmentation of the skin, hepatomegaly, prominence of the veins of the lower thoracic and upper abdominal walls and oedema of the feet for which the cause was suspected to be haemochromatosis. [In the paper generally much essential detail is missing.] *A. W. Woodruff*

Scott, E. M., Griffith, Isabelle V., Hoskins, D. D. & Schneider, Rose G. **Lack of Abnormal Hemoglobins in Alaskan Eskimos, Indians, and Aleuts.** *Science*. 1959, Mar. 13, v. 129, 719–20.

"In an examination of the blood of 708 Eskimos, 200 Aleuts, and 44 Indians in Alaska for abnormal types of hemoglobin, only normal hemoglobin A was detected. It may be concluded that abnormal hemoglobins in these races are rare if they occur at all."

Beaven, G. H. & Gratzer, W. B. **A Critical Review of Human Haemoglobin Variants. Part I: Methods for Separation and Characterization.** *J. Clin. Path.* 1959, Jan., v. 12, No. 1, 1–24. **Part II: Individual Haemoglobins.** *Ibid.*, Mar., No. 2, 101–15. [Numerous refs.]

El-Dewi, S. & Fahmi, T. **The Sickle Cell Trait in Egypt.** *J. Egyptian Med. Assoc.* 1958, v. 41, Nos. 9/10, 425–32, 1 map on pl. [14 refs.]

Of 5,000 patients examined in the haematological department of the University of Cairo, 8 showed the sickle-cell trait. None of the sicklers came from Cairo, but 6 were from scattered localities mainly in the Delta. 2 were from the Kena and Aswan Provinces, out of 1,031 persons from these regions. 82 Northern Sudanese were negative for the trait.

The authors recall their finding of a high cDe chromosome frequency in Egyptians, and tend to discount its value as a negroid race marker because it is accompanied by a very low sickling rate. But while they recognize the importance of endemic *P. falciparum* malaria in raising sickling rates they fail to draw the obverse conclusion regarding Egypt. *Alan B. Raper*

Tseng, H. L. **Fatal Cases of Acute Sicklemia.** *Arch. Pathology*. 1959, Mar., v. 67, No. 3, 339–46, 7 figs. [15 refs.]

The paper contains the case reports of 2 elderly Negroes with hypertension who died, predominantly of heart failure, after stormy and complicated illnesses, and treatment with numerous drugs including hypotensive agents. Infarcts were present post mortem in various organs, and the erythrocytes around these

infarcts were sickled. In neither case was the precise nature of the haemoglobin determined, other than that it contained Hb S. The abstracter finds no evidence to support the author's view that the infarcts were determined by the event of sickling, still less for his conclusion that "A fatal outcome can be avoided when routine sickling preparations are carried out in such patients". Fortunately, however, the cases are presented in full detail, so that the interested reader may form his own opinion from the original article. *Alan B. Raper*

JONES, Barbara & KLINGBERG, W. G. **Hemoglobin S—Hereditary Spherocytosis. Two Case Reports.** *J. Pediatrics.* St. Louis. 1959, Mar., v. 54, No. 3, 375–8. [14 refs.]

"Two cases of sickle cell hereditary spherocytosis have been presented. The repeated episodes of hemolysis were alleviated by splenectomy. Family studies are also described." [See this *Bulletin,* 1955, v. 52, 821; 1956, v. 53, 923.]

ERLANDSON, M. E., SCHULMAN, I. & SMITH, C. H. **Studies on Congenital Hemolytic Syndromes. II. Rates of Destruction and Production of Erythrocytes in Hereditary Spherocytosis.** *Pediatrics.* Springfield, Ill. 1959, Mar., v. 23, No. 3, 462–75, 3 figs. [53 refs.]

See this *Bulletin,* 1959, v. 56, 652.

MARISWAMY, M. L. & PIERCE, D. E. Margaret. **Thalassaemia in South India.** *J. Trop. Pediatrics.* London. 1959, Mar., v. 4, No. 4, 147–50. [14 refs.]

This is a report of 5 cases of what seems to be thalassaemia major in children seen in Mysore, S. India. Unfortunately, no electrophoretic examinations were performed, and therefore it is not possible to be certain whether the condition was thalassaemia or thalassaemia combined with another haemoglobinopathy. However, radiological examination of the skulls showed in 3 of them typical changes; and in 2 patients in whom it could not be performed the blood picture was typical for thalassaemia. One of these 2 was the sibling of a patient in whom the diagnosis had been more firmly established.

4 of the children—2 of them siblings—were Hindus and one a Muslim.

H. Lehmann

TOXOPLASMOSIS

ACAD. MED. SCI. Sect. of Infections with Natural Foci. Moscow. [**Toxoplasmosis. Abstracts of Communications at a Scientific Conference of the Institute of Epidemiology and Microbiology, 29th November–1st December, 1958**] 32 pp. [In Russian.] 1958.

In an introduction to this publication, D. N. ZASUKHIN gives a general account of the known facts about human toxoplasmosis, the study of which in the U.S.S.R. was initiated by E. N. PAVLOVSKY in 1955, though sporadic

cases of animal infections have been known there since 1911. In the available space it is only possible to give a general review of the subjects dealt with in the remaining 19 papers and to note items of special interest.

In a paper on *Toxoplasmosis as the Cause of Embryopathy,* G. A. Orlov and G. I. Golovatskaya state that promising results in the prevention of congenital toxoplasmosis were obtained by treating pregnant women with sulphonamides and chloridine (= pyrimethamine). During pregnancy the following double course (with an interval of 10 days) was carried out in each quarter: each course consisted of 0·5 gm. "sulphadimezine" [? = sulphadimidine], administered 3–4 times a day for 7 days, and 0·025 gm. pyrimethamine twice daily for 5 days. Out of 12 women with latent toxoplasmosis, who were treated, 6 gave birth to normal infants, in 2 treatment was unsuccessful, whereas in 4 there were no births. The incidence of toxoplasmosis in the U.S.S.R. was studied by S. G. Vasina and D. N. Zasukhin, who examined material from 129 cases, including 51 corpses. Parasites were detected in 8 of the latter. Z. L. Filippova-Nutrikhina reports on 9 cases of congenital toxoplasmosis among infants in a Moscow maternity hospital, diagnosed parasitologically (3) or serologically (6). The ages of the infants varied from 11 days to 3½ months; in 7 of them the first signs of the disease were revealed at birth, and in 2 in the course of 1½ and 3½ months, respectively. G. M. Maruashvili *et al.,* working in Tbilisi (Georgia), examined 24 children from 3 to 7 years old, who had various congenital and acquired defects of development. In 6 cases both the complement-fixation and allergic skin tests were positive, while in 3 only the latter.

V. A. Tabolin describes briefly the differential diagnosis of congenital toxoplasmosis, and S. Z. Kotliarevskaya deals with ophthalmological symptoms in this disease. F. D. Zabugina and M. G. Smaikina record observations on 7 cases of acquired toxoplasmosis in patients from 8 to 59 years old, in whom the duration of the disease was from 6 months to 15 years. The patients were treated with "sulphadimezine" and pyrimethamine, according to the scheme outlined above, but were apparently given a single course only. However, in these cases administration of the drugs was followed by intoxication, and, although there was marked clinical improvement in the patient, the effect of treatment did not last long. In a paper on neuro-psychic disorders in toxoplasmosis, A. M. Khaletskiy expresses the view that toxoplasmosis does not as a rule provoke any marked neuro-psychic changes, but renders the brain susceptible to subsequent damage. The vulnerability of the brain and its predisposition to nervous and psychic disturbance during later periods of life are supported by the fact that the percentage of positive serological and skin reactions is twice as high in inmates of mental hospitals than among the normal population. In order to determine the aetiology of congenital defects of development in newborn infants, A. I. Strukov and L. M. Bolkhovitinova examined 20 dead infants with such defects in whom toxoplasmosis was suspected. In 2 cases toxoplasmosis was confirmed, in 2 the diagnosis could not be established, whereas in 16 parasitological and histological examinations revealed no changes attributable to this disease.

E. B. Voyt describes the pathological anatomy of congenital toxoplasmosis, based on the examination of 6 infants (ages: 3 weeks to 6 months). In 4 of these there was hydrocephaly with necrotic foci in the brain; in 2 microcephaly, and in 4 deformed solidified optic thalami, while one also had calcifications in

the myocardium. In a comparative study of the serological reactions in toxoplasmosis, in which 267 sera were tested by both the dye and complement-fixation tests, G. A. Orlov *et al.* found that the former was more sensitive than the latter, the percentage of positive reactions obtained being 30% and 22%, respectively. L. I. Gracheva describes the preparation of antigen, for use with the complement-fixation test, as follows. Peritoneal exudate from infected mice, to which penicillin is added, is frozen at −70°C., after which it is subjected to lyophilic drying for 48 hours. The dry antigen, when kept in sealed ampoules at +4°C., remained active after 6 months. D. N. Zasukhin and G. T. Akinshina recommend the use of tissue culture for the diagnosis of toxoplasmosis. For this purpose they employ chick embryo tissues grown on coverslips in flasks containing Hanks saline 40%, amniotic fluid of cow 40% and ox serum 20%. Brain suspensions from experimentally infected rodents, inoculated on this medium, showed growth after 2–4 days.

In Tbilisi (Georgia), O. V. Mgaloblishvili and M. B. Kuchukashvili examined smears of the liver and cerebrospinal fluid of 140 dogs and inoculated mice with the latter: toxoplasms were detected in 7 animals. D. N. Zasukhin *et al.* made a similar survey of cats in Moscow: a number of them proved to be infected with toxoplasms, and had necrotic foci in the liver and spleen. In another paper D. N. Zasukhin reports the results of examination of several hundred rodents and insectivores in the Altai region [Middle Asia]: in the brain of 15 animals were found parasites resembling *Toxoplasma*. However, on closer study they proved to be more like *Besnoitia*. In view of the similarity of a number of other protozoa to *Toxoplasma* (*e.g., Atoxoplasma, Encephalitozoon, Hepatozoon,* etc.), the authors stress the importance of the differential diagnosis of such parasites. Finally S. F. Shimansky records the results of experiments on the part played by ticks of the U.S.S.R. in the transmission of toxoplasmosis. Ticks were fed on infected animals and chick embryos, as well as artificially (through capillary tubes), and were also inoculated into the body cavity with toxoplasms. It was found that in various species of ticks the toxoplasms retained their pathogenicity from 5 to 21 days, as shown by inoculation of mice with tick suspensions. Since mice could not be infected through the bite of ticks or by devouring them, it is concluded that ticks do not act as vectors of toxoplasmosis, but the parasites merely survive in their bodies.

C. A. Hoare

Beattie, C. P. **Toxoplasmosis, a General Introduction.** Reprinted from *Trans. Ophthalm. Soc.* 1958, v. 78, 99–108, figs. 36–9. [26 refs.]

Spencer, I. W. F. **Toxoplasmosis in South Africa. I. The Present Concept of Toxoplasmosis.** *South African Med. J.* 1959, Feb. 21, v. 33, No. 8, 156–63. [57 refs.]

"1. A broad outline is given of the distribution, classification, morphology, physiology, variation and culture of the parasite *Toxoplasma gondii*.

"2. Human infection and its forms of presentation, diagnosis and treatment are discussed.

"3. Attention is drawn to the incomplete understanding of the epidemiological features of toxoplasmosis."

RAWAL, B. D. **Toxoplasmosis. A Dye-Test Survey on Sera from Vegetarians and Meat Eaters in Bombay.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 61–3.

The sera of 246 people who eat meat (chicken and mutton) and 141 vegetarians of Bombay were examined by the modified Sabin-Feldman dye test, and the results were found to be much the same in the two groups—thus at a titre of 1 in 16, 18% of the former and 21% of the latter gave a positive result, as compared with 14% of 224 meat eaters of Sheffield, England. The English group eat pork and beef in addition to other meat and it is suggested that the consumption of well-cooked meat of any sort is without aetiological significance in people exhibiting sera positive to the dye test.

P. C. C. Garnham

RUBIN, M. L. **Studies on Toxoplasmosis.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 358–64, 1 chart. [13 refs.]

Three different experiments are reported in this paper. (1) The sera of 19 students in California were examined by the Sabin-Feldman dye test for 5 days in a fortnight and the titres were found to remain constant or showed only a two-fold dilution variation. (2) 21 volunteers were inoculated intradermally with toxoplasmin (the skin test antigen); 4 gave a positive reaction. The dye test was performed before and after the inoculation and in neither group was any appreciable change in titre observed. The highest titre was 1 in 8. (3) The effect of drugs on the course of toxoplasmosis in mice (induced by the RH strain) was studied. Three antimalarials—Plaquenil [hydrochloroquine sulphate], aralen and primaquine—had no apparent action; sulphonamides—sulphapyrazine, sulphadiazine and a mixture of sulphamylon and sulphamerazine (S-S) had a marked curative action which was enhanced by the addition of pyrimethamine; pyrimethamine alone had only a suppressive effect on the infection.

P. C. C. Garnham

LAINSON, R. **Observations on the Development and Nature of Pseudocysts and Cysts of** *Toxoplasma gondii*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 396–407, 16 figs. on 4 pls. [25 refs.]

There is considerable controversy regarding the method of multiplication of *Toxoplasma gondii*: while some authors believe that it divides by binary fission, others maintain that it reproduces by schizogony [or even internal budding: see this *Bulletin*, 1958, v. 55, 1375]. There are also conflicting views regarding the presence or absence of true cysts in the parasite.

In order to throw light on these questions, the author studied the development of *Toxoplasma* in the course of (a) acute infections in mice, guineapigs and multimammate rats inoculated with virulent strains of the parasite, and (b) chronic infections in mice and rabbits inoculated with non-virulent strains. Material from the infected animals was removed at different intervals, and stained smears and sections were examined for the developmental forms of the parasite.

In wet-fixed preparations of acutely infected animals it was seen that the parasites multiply by repeated binary fissions within the host-cell, which

becomes progressively distended, forming a membrane—usually containing the nucleus—around the accumulation of parasites. This membrane eventually ruptures, releasing the parasites. Since the membrane is elaborated by the host-cell—and not by the parasites—the structure in question is not a true cyst but a " pseudocyst ".

In the brains of chronically infected animals the toxoplasms first develop as in acute cases within " pseudocysts ", *i.e.*, membranes produced by the host-cells. However, from the 8th day onwards the multiplying parasites themselves produce an elastic membrane, which surrounds them and is stretched as their number increases, until some months later a spherical body, measuring up to 60 μ in diameter and containing several thousand parasites, is produced. These structures represent true cysts, differing from pseudocysts in the absence of any elements of the host-cell, and in their toughness. When artificially ruptured, the cyst-membranes have the appearance of " tiny deflated balloons ". Cysts of this type are also formed in macrophages of the lungs, and may be found lying free in the alveoli and bronchioles.

In the light of this investigation the life cycle of *Toxoplasma* in typical infections (usually chronic) comprises two phases: (1) a pseudocystic phase of short duration (8–11 days), when intracellular groups of parasites (= pseudocysts) are formed in different tissues, which are re-invaded after rupture of the host-cells, and (2) a cystic phase, occurring chiefly in the central nervous system and lungs, where they may persist up to 5 years. The free toxoplasms are unable to withstand conditions outside the host's tissues, therefore it is thought that their transmission to new hosts is effected by the resistant cysts. While carnivores are probably infected through the oral route, herbivorous animals are presumably infected by the droplet method, with sputum and saliva.

The appearance of pseudocysts and cysts of *Toxoplasma* is illustrated in photomicrographs. *C. A. Hoare*

Simitch, T., Pétrovitch, Z., Bordjochki, A. & Pop-Cénitch, S. Contribution à la connaissance de la virulence de *Toxoplasma gondii*. [**Observations on the Virulence of** *Toxoplasma gondii*] *Arch. Inst. Pasteur d'Algérie*. 1958, June, v. 36, No. 2, 165–72.

The susceptibility of white mice, hamsters and ground squirrels (*Citellus citellus*) was tested to 3 strains of *Toxoplasma gondii* given by various routes. Of 92 mice inoculated intraperitoneally with the Jugoslavian strain (J), 78% became infected; of 104 with the Czechoslovakian strain (Cz), 93% became infected; of 104 with the Paris (P) strain, 96% became infected. 10 mice were given the J strain by mouth and 7 contracted the disease; 10 received the Cz strain and all became infected; 10 were given the P strain and 8 became infected.

3 hamsters were inoculated intraperitoneally with the Cz strain and all died; 4 were inoculated with the P strain and all died; 3 with the J strain failed to show the infection but apparently were immunized because later inoculations with the more virulent strains were ineffective.

4 squirrels were given by mouth peritoneal exudate infected with the Cz strain and all died; the same result was obtained with the P strain. (The J strain is equally lethal.) *P. C. C. Garnham*

Simitch, T., Pétrovitch, Z., Bordjochki, A. & Pop-Cénitch, S. Contribution à la connaissance de la virulence de *Toxoplasma gondii* pour le lapin et le cobaye. [**Observations on the Virulence of *Toxoplasma gondii* in Rabbits and Guineapigs**] *Arch. Inst. Pasteur d'Algérie.* 1958, Dec., v. 36, No. 4, 461–9.

The authors tested the susceptibility of rabbits (2–12 months old) and guineapigs (2–4 months old) to 3 strains of *Toxoplasma gondii* (Jugoslavian,—J, Czechoslovakian,—Cz, and CB Paris,—P) introduced by 4 routes (orally by food, nasally by spray, subcutaneously and intraperitoneally).

The rabbits failed to become infected with any of the strains given by mouth (16) or intranasally (4); strain J gave rise to an infection in 2 out of 10 inoculated subcutaneously; strain J infected 6 out of 10, strain Cz 5 out of 5, and strain P 5 out of 5 inoculated intraperitoneally.

The guineapigs failed to become infected with any of the strains given by mouth (21); strain J infected 2 out of 6, strain Cz 2 out of 4, and strain P 2 out of 5 introduced intranasally; strain J infected 3 out of 11 and strain Cz 3 out of 5, while strain P failed to infect subcutaneously; strain J infected 4 out of 5, and strains Cz and P 10 out of 10 when inoculated intraperitoneally.

Thus the Jugoslavian strain shows the same lesser degree of virulence in these animals as it does in the animals tested in the previous paper [see above].

[The infective material was obtained by making a suspension of the internal organs of ground squirrels in which the strains were maintained. The organs were obtained from animals which had died of acute toxoplasmosis, and it is probable that only, or chiefly, the proliferative forms of the organism were present in the suspension, rather than the cysts of the chronic type of disease. The former are liable to digestion in the alimentary tract, and the failure to infect by mouth might have been due to this fact, while positive results might have been obtained if the cysts had been employed.] *P. C. C. Garnham*

Orłow, G. & Dymowska, Zofia. Porównawcza ocena antygenów toksoplazmowych stosowanych do reakcji wiązania dopełniacza. [**Comparative Evaluation of Toxoplasma Antigens used in Complement-fixation Tests**] *Med. Dośw. i Mikrob.* Warsaw. 1958, v. 10, No. 3, 339–48. English summary (9 lines).

A comparison has been made of *Toxoplasma* complement-fixing antigens prepared in Moscow and in Warsaw from the peritoneal exudate of infected mice by two different procedures. In the first method the toxoplasms in the citrated exudate were killed by exposure to ultra-violet irradiation, sedimented, re-suspended in distilled water and frozen and thawed 10 times. The second type of antigen was prepared by mixing the exudate with an equal volume of ether, which was shaken well, evaporated to dryness in the incubator and taken up in 100 parts of 0·25% phenol in saline. Neither type of antigen was anti-complementary. In complement-fixation tests carried out on 32 sera with antigen of the first type the materials prepared in the two different laboratories gave identical results in 30 instances, and agreement was obtained in 50 of 54 instances in tests carried out with the second type of antigen. *D. J. Bauer*

MARTIN, L. A. & BESIAT, Paulette. Contribution au diagnostic de la toxoplasmose. [**Observations on the Diagnosis of Toxoplasmosis**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 495–9.

In 2 sheep experimentally infected with toxoplasms, the complement-fixation test became positive and then reverted to negative. An intradermal injection of the antigen caused the reappearance of the complement-fixing antibodies. A sheep with naturally acquired toxoplasmosis showed the same thing, while a sheep without toxoplasmosis failed to produce antibodies after intradermal injection of the antigen. The authors feel that where toxoplasmosis is suspected and the complement-fixation test is negative it may be worth while trying to demonstrate antibodies by this method. *I. A. B. Cathie*

LUNDE, M. N. & JACOBS, L. **Characteristics of the *Toxoplasma* Hemagglutination Test Antigen.** *J. Immunology.* 1959, Feb., v. 82, No. 2, 146–50.

VASINA, S. G., VOYT, E. B. & FILIPPOVA-NUTRICHINA, Z. L. [**On Congenital Toxoplasmosis**] Reprinted from *Voprosy Ochrany Materinstva i Detstva.* 1958, No. 3, 58–65, 5 figs. [In Russian.]

The authors reckon that up to the time of writing less than a score of cases of congenital toxoplasmosis had been recorded from the U.S.S.R. In the present paper they describe 2 more cases, both new-born male infants, who were under observation in a children's hospital in Moscow. One of them was admitted at the age of 24 days and died 15 days later. He showed signs of defects in foetal development, microcephaly, omphalitis, congenital heart disease and bilateral focal pneumonia. Diagnosis of toxoplasmosis was confirmed by the finding of parasites in organ smears of the patient and by successful infection of mice with organ suspensions. The second infant was admitted when 15 days old and died after 17 days. Autopsy revealed meningo-encephalitis, moderate hydrocephaly, bilateral focal catarrhal pneumonia and otitis. Diagnosis of toxoplasmosis was confirmed by the detection of parasites in organ smears.

The case histories of these patients are described in great detail, with [very poor] illustrations. *C. A. Hoare*

COOK, M. Katherine. **The Development of a Pyrimethamine-Resistant Line of *Toxoplasma* under *in vitro* Conditions.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 400–402.

Tissue cultures of monkey kidney epithelium were infected with the RH strain of *Toxoplasma gondii,* and pyrimethamine was added in a concentration of 0·001 mgm.% (0·025 mgm.% is the minimum effective dose); on the third day, cell suspensions were centrifuged and the sediment was inoculated into mice; infected peritoneal exudate of the latter was re-inoculated into similar tissue cultures but with twice the concentration of drug; this procedure was repeated 15 times. Ultimately the organism could be maintained *in vitro* with 16 mgm. of pyrimethamine, indicating that a line 640 times more resistant than the original had been obtained. Resistance persisted for a period of 3 months

after growth of the organism in tissue culture in the absence of the drug; this stable character was thought to be due either to the effect of contact with the drug leading to a change in the parasite or to the selection of an early mutant. Further experiments showed that no drug dependence had developed and that resistance to the drug could not be demonstrated *in vivo* where the ordinary and the resistant strains both reacted in the same way to scaled doses of pyrimethamine. *P. C. C. Garnham*

DERMATOLOGY AND FUNGUS DISEASES

GELFAND, M. **Dermatitis Gangrenosa et Bullosa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 78–82, 2 figs.

The disease usually starts suddenly in an African who had previously enjoyed good health. It may attack an infant, child or adult and appears to have no predilection for either sex. It is ushered in by general malaise, fever and the appearance of superficial plaques on the skin which soon become converted into blackish blisters of different size and shape. These vary in size from a few millimetres to a few centimetres and may be found anywhere, particularly on the face, trunk, buttocks and thighs.

As well as the blisters, a large major lesion is characteristically present and may measure several inches in diameter. This is the result of severe confluent blisters. After several days the skin in the area dries and breaks off, exposing a fairly healthy granulomatous surface. No significant organisms were grown from the blister fluid but there was usually a moderate leucocytosis, the increase being mostly in neutrophil polymorphs.

All the affected patients recovered although a few were very ill in the early stages of the disease. Injections of penicillin and local applications of eusol appeared to help.

The aetiology of the condition is unknown. It can be distinguished from ecthyma, the Stevens-Johnson syndrome, pemphigus and dermatitis herpetiformis. There is, however, some resemblance to tropical ulcer, cancrum oris and Fournier's syndrome and it is possible that they have a common or related factor such as an arterial thrombosis which determines the sudden onset of gangrene.

Two cases are described in detail and illustrated by photographs.

H. T. H. Wilson

MACKINNON, J. E. Amfotericina B en la blastomicosis sudamericana experimental. [**Amphotericin B in Experimental South American Blastomycosis**] *An. Facul. de Med. Montevideo.* 1958, Sept.–Oct.–Nov.–Dec., v. 43, Nos. 5/6, 201–6, 1 graph. [17 refs.]

The English summary appended to the paper is as follows:—

"The growth of two strains of *Paracoccidioides brasiliensis,* yeast phase, on nutrient glucose agar with 20 % of horse serum, 10 days at 30° C, was completely inhibited by a concentration of 0·1 μg/ml of amphotericin B.

"Two groups of mice were inoculated intraperitoneally and two and three months later treated during 20 days with amphotericin B administered subcutaneously; daily dose 2 mgs. Similar groups inoculated simultaneously

were not submitted to treatment. 2½ months after the end of the treatment a higher number of survivors was registered among the mice which received amphotericin B and the lesions were usually localized in the peritoneum.

" Another group of mice was inoculated intravenously and amphotericin B was administered immediately, subcutaneously, during 10 days and a new series was given after an interval of 30 days; daily dose 2 mgs. A similar group was inoculated simultaneously and was not submitted to treatment. As shown by the table amphotericin B delayed the course of the infection. The survival time was 59·8 % of the 150 days' observation period among the mice which did not receive amphotericin B and 85 % among those which were submitted to treatment.

" *P. brasiliensis* was cultivated from six mice which received amphotericin B and which showed severe lesions similar to those of non treated mice. The sensitivity of these cultures to amphotericin B was identical to that of the culture which was inoculated."

VENOMS AND ANTIVENENES

KOCHWA, S., GITTER, S., STRAUSS, Amalia, DE VRIES, A. & LEFFKOWITZ, M. **Immunologic Study of *Vipera xanthina palestinae* Venom and Preparation of Potent Antivenin in Rabbits.** *J. Immunology.* 1959, Feb., v. 82, No. 2, 107–15, 5 figs. [15 refs.]

" 1. Specific horse and rabbit antisera against *Vipera xanthina palestinae* venom were studied by neutralization tests in mice and by the double gel diffusion technique of Ouchterlony.

" 2. Specific antivenom horse and rabbit sera had antihemorrhagic activity but no antineurotoxic activity when tested in mice.

" 3. No correlation was found between the neutralizing potency of these antisera and the number of precipitation lines obtained when tested against whole venom and electrophoretically separated venom fractions.

" 4. When rabbits immunized with whole venom were subsequently immunized with a mixture of the two electrophoretically separated neurotoxic fractions, a serum was obtained which had antineurotoxic as well as antihemorrhagic activity and which protected mice against death even when high venom doses were used.

" 5. This enriched serum showed in Ouchterlony plates two additional precipitation lines, each line with an antigen located in one of the two neurotoxic fractions."

[See this *Bulletin,* 1957, v. 54, 873.]

ORDMAN, D. **Desensitization to Bee Stings by Intracutaneous Injections of Whole-Bee Extract.** *Brit. Med. J.* 1958, Aug. 9, 352–5.

" A procedure is described for the prophylactic desensitization of persons sensitive to bee stings by the use of increasing strengths of whole-bee extract administered intracutaneously.

" A preliminary intracutaneous skin test is performed to determine the degree

of the patient's sensitivity to the extract that is to be used for subsequent desensitization.

" Successful desensitization is reported of 19 persons originally highly sensitive to bee stings."

TROPICAL OPHTHALMOLOGY

VELLIEUX, M., LE BRETON, G., OLIVEAU & LARMANE, A. Le trachome en Casamance. Premiers essais de traitement de masse de l'endémie trachomateuse en A.O.F. [**Trachoma in Casamance (A.O.F.)**] *Rev. Internat. du Trachome.* 1959, v. 36, No. 1, 96–105, 1 map.

The English summary appended to the paper is as follows:—

" Description of the geographical, demographical, hydrographical and ethnical conditions of the country.

" The average rate of 16·75 % of trachomatous has been noted, with 12 % in childhood, and racial incidence.

" An antitrachomatous campaign by daily applications of aureomycin ointment at 3 % for 3 months has been carried out by local ambulatory agents.

" 22,020 trachomatous (out of 222,107 surveyed) have been treated. Results: 74 % healed, 14 % improved, 12 % failed."

COLLIER, L. H. **Observations on Trachoma Virus isolated in Embryonate Eggs.** *Rev. Internat. du Trachome.* 1959, v. 36, No. 1, 57–65, 4 figs.

" By inoculating conjunctival scrapings from trachoma patients into the yolk-sacs of embryonate eggs, viruses have been isolated in the Gambia which resemble those described by T'ang and his co-workers in China. Of 25 patients diagnosed as trachoma by the criteria laid down by the W.H.O. Expert Committee, 14 were inclusion-positive, and viruses were isolated from each of these. Of the 11 inclusion-negative cases, virus was isolated from 5. Virus could not be isolated from 14 clinically normal inclusion-negative control subjects.

" Both the African and Chinese viruses are morphologically and serologically related to the psittacosis-lymphogranuloma group. By successful inoculation of a human volunteer and a baboon, it has been proved that one of the African strains (G1) is aetiologically related to trachoma."

[See this *Bulletin,* 1959, v. 56, 95.]

GIROUD, P.; RENOUX, G.; NATAF, R. Études sur le trachome. I. Cultures de produits trachomateux sur souris, merions, gerbilles et oeufs embryonnés [**Studies on Trachoma. I. Culture of Trachomatous Material in Mice, Merions, Gerbils and Chick Embryos**] [GIROUD, RENOUX & NATAF]. *Arch. Inst. Pasteur de Tunis.* 1958, Sept.–Dec., v. 35, Nos. 3/4, 327–32. II. Études sérologiques au cours du trachome humain spontané ou provoqué et sur les animaux infectés par voie générale avec les cultures de l'agent du trachome [**II. Serological Studies in Experimental and Spontaneous Trachoma in Man and in Parenterally Infected Animals**] [RENOUX, GIROUD

& NATAF]. *Ibid.*, 333–5. III. Constatations morphologiques et serologiques faites sur des jeunes trachomateux avec des antigènes du même groupe, mais en dehors du trachome [**III. Morphological and Serological Observations on Children with Trachoma made with Related Antigens**] [GIROUD & RENOUX]. *Ibid.*, 337–9. IV. Présence des anticorps locaux vis-à-vis du groupe psittacose (ou voisins) au cours de l'évolution du trachome [**IV. Presence of Local Antibodies to the Psittacosis Group in Cases of Trachoma**] [GIROUD & RENOUX]. *Ibid.*, 341–2.

I. With material from human trachoma the authors infected the chorio-allantois of developing hens' eggs and the lung tissue of mice, gerbils and merions. Infection was judged to have occurred if there were obvious lesions and if smears made from them showed elements similar in staining and morphology with those seen in the natural disease. Passage was readily obtained in both media and 2 human volunteers were successfully infected, one with 7th egg-passage material, the other with a strain which had been passed 7 times in rodents.

II. Micro-agglutination tests were made with mouse-lung suspensions of psittacosis virus and one of the authors' strains of trachoma virus; control antigens made from various rickettsiae were included in the tests. According to the authors the value of this type of test "*n'est plus à démontrer*". Sera collected from 2 volunteers 21 days after infection with different strains of trachoma agglutinated the trachoma antigen at 1 in 20 and 1 in 40, but were without action on psittacosis virus; they had been negative for both viruses before infection. The sera of 12 of 14 patients with spontaneous trachoma were positive; 1 agglutinated psittacosis virus. Sera from 25 various, non-trachomatous infections were negative. Comparable tests were made on infected rabbits.

III. Using both micro-agglutination and complement fixation with suitable antigens, the authors have examined the sera of young children suffering from trachoma, for the presence of group antibodies. Those found reacted with psittacosis and closely related "neorickettsial" antigens. No antibodies were found to a rickettsial antigen.

IV. Extracts of trachomatous nodules were examined for group antibody by means of the micro-agglutination technique and suspensions of psittacosis virus (1) and of "neorickettsia" (2). 3 out of 13 cases of trachoma showed the presence of group antibody in low concentration. *S. P. Bedson*

MISCELLANEOUS DISEASES

NGUYEN-VAN-AI. Les cancers au Sud-Viet-Nam en 1957. Fréquences absolue et relative. Répartition selon le type histologique, le siège, l'âge, le sexe, la race. Comparaison avec les années précédentes. [**Incidence of Cancer in South Vietnam in 1957, in Relation to Type, Site, Age, Sex and Race. Comparison with Previous Years**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 421–38, 1 graph. [13 refs.]

Study is made of the malignant tumours observed in 1957 in 1,303 Vietnamese (with a sex ratio of 391 men to 912 women), 77 Chinese and 31

persons of other nationalities. With the Vietnamese women the dominating site is the uterus, which accounted for nearly one-half of the cases. The breast forms a relatively small proportion (8%) and the second site of importance is the buccal cavity with 162 cases. The digestive system provides only 39 cases. Among Vietnamese men the largest contribution comes from the buccal cavity (132 out of the total 391 cases) and only 3 lung-cancers are reported. Cancers of the male genito-urinary system also appear to be relatively frequent and the stomach is proportionately more frequently affected than with women (though not absolutely). In both sexes the majority of cases occur in the age-groups 31 to 70. Histological and pathological data are set out in considerable detail but do not lend themselves to abstracting. *A. Bradford Hill*

CARCASSI, U. Aspetti medico-sociali del favismo. [**Medico-Social Aspects of Favism**] *Igiene e San. Pubblica.* Rome. 1959, Jan.–Feb., v. 15, No. 1, 28–49, 7 graphs. [34 refs.]

The English summary appended to the paper is as follows:—

"The literature concerning the history and aetiopathogenic theories upon favism are summarized. The clinical, serological and biochemical aspects of this heredofamilial disease are exposed.

"The conclusion is drawn that favism shows its importance as a social disease. At last the means to control the syndrome in question are suggested."

GANAPATHY, Seetha N., KRISHNAMURTHY, K., SWAMINATHAN, M. & SUBRAHMANYAN, V. **Studies on the Non-Protein Nitrogenous Constituents of Resting and Germinated** *Lathyrus sativus* **Seeds.** *Ann. Biochem. & Exper. Med.* Calcutta. 1958, v. 18, No. 5, 157–60. [15 refs.]

LEIBINA, E. M. **Primary Sensitivity of** *Klebsiella rhinoscleromatis* **to Synthomycin, Chloramphenicol and Chlortetracycline.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1958, v. 29, No. 7, 1042–4. [Translated from Russian.]

"1. Tests on artificial nutrient media showed that synthomycin inhibited the growth of *Klebsiella rhinoscleromatis* in a concentration of 7·8–125 μg/ml, and chlortetracycline and chloramphenicol in concentrations of 0·25–15·6 μg/ml.

"2. The sensitivity of freshly isolated strains of *K. rhinoscleromatis* to chlortetracycline was considerably higher than that of strains preserved in the laboratory."

PARASITOLOGY: GENERAL

KUNTZ, R. E., LAWLESS, D. K. & MALAKATIS, G. M. **Intestinal Protozoans and Helminths in Americans residing in Southern Taiwan (Formosa).** *Amer. J. Trop. Med. & Hyg.* 1959, Jan., v. 8, No. 1, 63–6.

A number of studies have been made to determine whether foreign residence alters the human intestinal fauna [see LINCICOME *et al.*, this *Bulletin*, 1950,

v. 47, 987; KEAN and SMILLIE, *ibid.*, 1955, v. 52, 634]. This study records the results of examining single stool specimens from 116 military personnel and 184 of their dependants stationed in Southern Taiwan, and of a short questionnaire concerning their eating habits, occurrence of diarrhoea, etc.

The results are tabulated and differ little from those expected in a similar survey in the U.S.A. The general incidence of *Entamoeba histolytica* was low but was higher in the soldiers than in their dependants, and the large race was, unexpectedly, greater in incidence than the small. *Ascaris* infections showed an overall rate of about 13%, but was 17% in the soldiers as compared with 10% in their dependants; the incidence in the local people is over 60%. It is believed that the wide use of antibiotics may be responsible for the low incidence of protozoal parasites.

The enquiry revealed that the dependants bought food in the market, employed local staff who handled food, and ate in restaurants, thus risking infection. However, hot dishes were usually selected and Chinese food is usually served very hot. Moreover, American demands in the matter of cleanliness were so well known that employees treated themselves before examination. Diarrhoea was more common than in the U.S.A. but was thought to be bacterial. *T. H. Davey*

ROTHSTEIN, N. **Vital Staining of Blood Parasites with Acridine Orange.** *J. Parasitology.* 1958, Dec., v. 44, No. 6, 588–95, 3 text figs. & 5 coloured figs. on pl. [15 refs.]

The author describes the results of examination of various blood parasites by vital staining with basic fluorochrome acridine orange, kept as a stock 1:5,000 aqueous solution. When added to a fresh blood preparation the dye stains all its cellular constituents, except mammalian erythrocytes. However, the nuclei of nucleated red cells, as well as various intra- and extracellular parasites, take up the stain. In preparations containing various concentrations of the dye (from 1:10,000 upwards) and examined under dark-field illumination at magnifications from × 400 upwards, the parasites (*Plasmodium relictum, P. berghei, Trypanosoma cruzi, T. equiperdum, Leptospira* and microfilariae) can be readily detected as refractile stained bodies, some of which remain viable for 4–6 days.

The appearance of preparations stained by this method is shown in a coloured plate and in photomicrographs. *C. A. Hoare*

MATSUBAYASHI, H., KOIKE, T., MIKATA, I., TAKEI, H. & HAGIWARA, S. **A Case of Encephalitozoon-Like Body Infection in Man.** *Arch. Pathology.* 1959, Feb., v. 67, No. 2, 181–7, 6 figs.

This careful paper describes first the clinical features presented by a patient 9 years old, living on a farm in Kanagawa Ken, Japan. The symptoms were recurrent fever (up to 39°C.), loss of consciousness after a fit, vomiting and headaches, occurring over a period of three weeks. No significant laboratory findings were made except for the discovery of small oval bodies (up to 3μ in length) in the sediment of the cerebrospinal fluid, and of the urine. Isolations of the organism were carried out by inoculating the following material into the peritoneum of white mice: cerebrospinal fluid (on two occasions), blood

(once) and urine (once, after two blind passages); the strain was maintained by serial passage of peritoneal exudate or emulsions of organs (brains, livers and spleens). The infected mice showed an illness accompanied by a gradual distension of the abdomen due to ascites, reaching a maximum during the fourth or fifth week, and then gradually recovered; the spleen and liver became much enlarged, friable and purple red in colour.

The parasites were extracellular at first, but after the second passage were mostly in macrophage cells; they were Gram positive. The Sabin-Feldman dye test was negative in the boy and in the subinoculated animals, and this fact, together with the size of the organism and its staining reactions, makes it clear that the organism was not *Toxoplasma*. On the other hand, it showed all the characters of *Encephalitozoon*, with which it was identified.

[*Encephalitozoon* has been recorded from man on previous occasions, but these observations were probably fallacies of one sort or another. In this case the organism was seen and recovered in cerebrospinal fluid and in urine several times, and isolations were made into white mice, while 30 control mice remained negative. *Encephalitozoon* is a common natural parasite of white mice and in uncontrolled experiments its presence can easily lead to erroneous conclusions; here, however, the facts are clear, and the authors' conservative attitude, suggesting "the possibility that the organisms recovered from the patient are *Encephalitozoon*" is quite acceptable.] *P. C. C. Garnham*

LAIRD, M. **Malayan Protozoa. 1.** ***Plistophora collessi*** **n. sp. (Sporozoa: Microsporidia), an Ovarian Parasite of Singapore Mosquitoes.** *J. Protozoology*. Utica. 1959, Feb., v. 6, No. 1, 37–45, 20 figs. [24 refs.]

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

BUTTIKER, W. & BEALES, P. ***Anopheles pampanae,*** **a New Species of Mosquito from Cambodia.** [Miscellanea.] *Acta Tropica*. Basle. 1959, v. 16, No. 1, 63–9, 2 figs.

MACDONALD, W. W. **A Resurvey of** ***Aedes aegypti*** **at Kuala Lumpur Airport.** *Med. J. Malaya*. 1958, Dec., v. 13, No. 2, 179–86, 2 figs.

In 1956 a survey at Kuala Lumpur airport revealed considerable breeding of *Aëdes aegypti* [see this *Bulletin*, 1956, v. 53, 1390]. Since then the airport has been given international status and *Aëdes aegypti* eradication has become obligatory. During a resurvey in 1958 the search was concentrated within the control zone extending 400 yards around the airport perimeter, but where thought desirable adjoining areas also were examined. The results indicate that *Aëdes aegypti* is absent from within the airport perimeter and only 1 breeding place has been found in the 400-yard zone around it. Outside this zone breeding was common in an urban and factory area to the north of the

control zone. It has been recommended that control should be extended for 200 yards north of the present control zone in this area.

DDT had been used in Malaya for *Aëdes aegypti* control but poor results were obtained. In 1955 perifocal spraying was introduced [*ibid.*, 1958, v. 55, 151] with dieldrin which was substituted for DDT. Investigation of a Kuala Lumpur strain of *Aëdes aegypti* which had not been previously exposed to DDT showed that it was relatively resistant to this insecticide but was normally susceptible to dieldrin and certain others. These findings were corroborated by SHIDRAWI [*ibid.*, 1958, v. 55, 703]. It is anticipated that spraying will now be suspended in some sectors and reduced to once annually in others so that risk of resistance to dieldrin will be reduced. In addition to control by insecticide a permanent team collects discarded containers in the compounds around the airport. Fogging was tried with a Swingfog portable generator containing 15% dieldrin emulsion. Mosquito catches fell sharply and remained low for 5 weeks but reverted to the original levels in 8 weeks. Fogging is a rapid and effective means of reducing outdoor mosquito populations and is a useful supplement to more permanent control measures. *T. H. Davey*

BARR, A. R. & AL-AZAWI, A. **Notes on Oviposition and the Hatching of Eggs of *Aedes* and *Psorophora* Mosquitoes (Diptera: Culicidae).** *Univ. Kansas Sci. Bull.* 1958, Nov. 18, v. 39, 263–73.

ABONNENC, E. & LARIVIÈRE, M. Répartition des Phlébotomes de l'Ouest africain (Diptera-Psychodidae). [**Distribution of West African *Phlebotomus***] *Bull. Inst. Français d'Afrique Noire.* Ser. A. 1959, Jan., v. 21, No. 1, 204–26, 11 figs. [Numerous refs.]

This paper gives a list of 28 species and varieties of *Phlebotomus* from West Africa, with locality records from Senegal, Upper Volta, French Sudan, Dahomey, Ivory Coast, Togoland and French Guinea. The distributions of these species are shown on 11 maps, which also show records from Ghana, Nigeria and Sierra Leone. A brief account of the distribution of each species in the rest of Africa is also given. *B. R. Laurence*

FAIRCHILD, G. B. & HERTIG, M. **Notes on the *Phlebotomus* of Panama. XV. Four Apparently New Synonymies (Diptera, Psychodidae).** Reprinted from *Proc. Entom. Soc. of Washington.* 1958, Oct., v. 60, No. 5, 203–5.

Examination of *Phlebotomus* material collected in Panama and elsewhere in South America has led the authors to suggest the following synonymies:

P. almazani Galliard (1934) should now be *P. longipalpis* Lutz and Neiva (1912); *P. pinealis* Floch and Abonnenc (1944) should be *P. saulensis* Floch and Abonnenc (1944); *P. foliatus* Mirsa and Ortiz (1952) should be *P. vexillarius* Fairchild and Hertig (1952), and *P. acanthobasis* Fairchild and Hertig (1952) should be *P. camposi* Rodriguez (1950). *E. R. Nye*

GIL COLLADO, J. Metodos de lucha contra los *Culicoides*. [**Methods for the Control of *Culicoides***] *Med. Trop.* Madrid. 1958, Dec., v. 32, No. 6, 429–37.

Sharma, M. I. D., Krishnamurthy, B. S. & Singh, N. N. **Note on the Susceptibility to D.D.T. of Houseflies of Delhi and Rajasthan.** *Indian J. Malariology.* 1958, Sept., v. 12, No. 3, 203–7. [11 refs.]

"Houseflies (genus *Musca*) collected from a D.D.T. sprayed village of Delhi and an unsprayed village of Rajasthan were colonised in the laboratory and tested for their susceptibility to D.D.T. Flies of the Delhi strains in F_2 generation were found to be more tolerant to D.D.T. than those of the Rajasthan strains."

Van Asperen, K. & Oppenoorth, F. J. **Organophosphate Resistance and Esterase Activity in Houseflies.** *Entomologia Exper. et Applicata.* Amsterdam. 1959, Mar., v. 2, No. 1, 48–57, 1 fig.

"Esterase activities were measured in homogenates of organophosphate resistant and susceptible houseflies using several substrates. No differences were found between the cholinesterase activities. The ali-esterase activity, however, proved to be very much lower in the resistant than in the susceptible strains. It is concluded that resistance and low ali-esterase activity are physiologically connected."

Flemings, M. B. **Blowfly Myiasis in Man. Report of Two Cases.** *U.S. Armed Forces Med. J.* 1959, Mar., v. 10, No. 3, 297–303, 2 figs. [30 refs.]

"Two new cases of myiasis (wound and intestinal) in man are reported from the northeastern part of the United States, an area from which no case has been reported during the past 10 years. The case of wound myiasis resulted from infestation of *Phaenicia* species larvae and then reinfestation with larvae of *Callitroga macellaria*. The case of intestinal myiasis was caused by invasion of *Phaenicia sericata* larvae. Both patients lived in properly screened homes.

"In these days of ordinarily strict aseptical practices of modern medicine, it is possible that cases of infestation in man by larvae or ova of the blowfly may not be diagnosed by practitioners. That this phenomenon may be more prevalent in this region of the country than is commonly recognized is also probable."

Pampiglione, S. Indagine epidemiologica sulla miasi umana da *Oestrus ovis* in Italia. Nota II. Inchiesta tra i pastori. [**Epidemiological Study of Myiasis in Man due to *Oestrus ovis* in Italy. II. Survey of Shepherds**] *Nuovi Ann. d'Igiene e Microbiol.* 1958, Nov.–Dec., v. 9, No. 6, 494–517, 1 map. English summary.

Infection of shepherds with larvae of *Oestrus ovis* is quite extensive and common in Italy. Of 101 shepherds interviewed by the author 85·6% reported one or more infections. Details are given of the provinces where cases occurred and of the cases. Infection of the upper respiratory tract was more usual than conjunctival infections; sinus and ear infection was rare.

[For Part I, see this *Bulletin*, 1959, v. 56, 224.] *D. S. Bertram*

GROBOV, A. G. **[Species Composition and Ecology of Ticks in the Heraclean Peninsula (Crimea)]** *Med. Parasit. & Parasitic Dis.* Moscow. 1959, v. 28, No. 1, 32–7, 1 map. [In Russian.]

The English summary appended to the paper is as follows:—

"Species composition and ecology of ticks, inhabiting the Heraclean peninsula in the Crimea, were investigated during 4 consecutive years. 11 different species were found on various domestic and wild animals as well as on plants and men (see table 1).

"The species composition and numbers of ticks vary according to landscape features (see table 1 and map) and seasons of the year (see table 2). Nymphs are most often encountered in summer and autumn. In September nymphs of I. persulcatus are occasionally found on transmigrating quails. Since this species does not inhabit the Crimea it is, evidently, carried over there by quails from the forest belt of northern Russia."

KEEGAN, H. L. & TOSHIOKA, S. **Ixodid Ticks of Japan, Korea and the Ryukyu Islands.** 37 pp., 42 pls. [Numerous refs.] 1957, Sept. 1. San Francisco: Commanding Officer, 406th Medical General Laboratory, APO 343, U.S. Army Medical Center, Calif., U.S.A.

This is a very useful account of the ixodid ticks of Japan, Korea and the Ryukyu Islands. The genera represented (number of species in brackets) are as follows: *Amblyomma* (2), *Boophilus microplus, Haemaphysalis* (9), *Ixodes* (8). Several species of *Dermacentor* are reported from the region but specific identification is here withheld since the range of variation possible within species is not certain. The excellent drawings of all the species of ticks include associated males and females of *Dermacentor* to assist future workers on this genus. As regards *Rhipicephalus, R. sanguineus* was found only once on a child in a U.S. forces installation. Reliable facts on tick-borne diseases were difficult to obtain although much effort was made to get information. Tularaemia occurs in parts of Japan, with human infections attributed to tick bite or crushing ticks. Peak incidence is in the winter hunting season. Wild hare, pheasants, squirrel and bear are implicated and the agent isolated from species of *Ixodes* and *H. flava,* the latter the dominant tick parasite of hares. Trans-stadial and trans-ovarial passage of the agent has been demonstrated in *H. flava.* Piroplasmosis is reported from some of the Ryukyu Islands. *B. microplus* is present on the cattle.

There are keys to tick genera and to species when there are several species in genera, except *Dermacentor.* Notes are given for each species, on hosts, distribution generally and in the area of this study, material examined, biology and other points of particular interest. *D. S. Bertram*

WILLIAMS, R. W. **An Infestation of a Human Habitation by** *Dermanyssus gallinae* **(Degeer, 1778) (Acarina: Dermanyssidae) in New York City resulting in Sanguisugent Attacks upon the Occupants.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 627–9. [10 refs.]

A single instance of infestation of a household in New York by *Dermanyssus gallinae* is described. The infestation appeared to originate from a nearby

congregating point for pigeons and strong evidence was obtained that feeding on human beings was taking place; mammalian erythrocytes were in fact found in the mites. Disinfestation measures are given, benzylbenzoate being found of value in disinfesting the head of a female occupant of the household. The author prefaces his account with a review of past literature on the feeding habits of *D. gallinae* and notes the uncertainty of whether it feeds on man or not.

[See also this *Bulletin*, 1958, v. 55, 1058.] *E. R. Nye*

Davis, D. H. S. & Oettlé, A. G. **The Multimammate Mouse** *Rattus* (*Mastomys*) *natalensis* **Smith: a Laboratory-Adapted African Wild Rodent.** Reprinted from *Proc. Zool. Soc. Lond.* 1958, v. 131, Pt. 2, 293–9, 1 fig. on pl. [33 refs.]

MISCELLANEOUS PAPERS

Wilcocks, C. **The Writing of Medical Papers.** *Central African J. of Med.* 1958, Dec., v. 4, No. 12, 545–50; 1959, Jan. & Feb., v. 5, Nos. 1 & 2, 26–9; 72–4. [17 refs.]

It is impossible to make a worthy summary of these three articles; for they represent, in highly concentrated form, the distilled wisdom of an editor of many years' experience. Few can have wider knowledge than Dr. Wilcocks of the uneven quality of medical publications; and here, while modestly admitting his own liability to commit inadvertently the kinds of fault against which he tactfully warns his readers, he gives most useful advice upon how to present the results of scientific work attractively and effectively, and in a form making for easy reading—which, as he points out with an apt quotation from Sheridan, is not necessarily the complement to easy writing.

In the first article he discusses the planning of a paper and makes the important point that, while the reporting of facts may be, and often is, monotonous by itself, a discussion of their possible implications may be fascinating, and make all the difference between a dull paper and a lively one. He then considers the nature and purpose of each of the recognized components of a well-constructed paper, including the choice of a title, and of a sub-title where necessary; saying that the title of a paper should be brief, relevant, self-explanatory and unequivocal, he gives some amusing examples of titles which, if listed out of context, might be open to misinterpretation. Valuable guidance is given upon such different problems of medical authorship as the citation of publications by other writers and the drawing of graphs and histograms for lucid reproduction. Dr. Wilcocks discusses, at some length, the subtleties of zoological and botanical nomenclature which concern, particularly, the writer upon tropical diseases. He appeals for the accurate description of drugs, whenever possible under their chemical or accepted official names, as well as under their proprietary names, if any; and he urges due care in the recording of doses. His first article ends with a discussion of the functions of the Summary or Synopsis at the beginning or end of a paper, rightly making

the point that a summary giving only the scope of the paper, without a note of the chief findings and conclusions, is unhelpful to the reader—a fact of which the author of the present summary is only too conscious !

The first half of Dr. Wilcocks's second article contains many useful and practical hints upon the preparation of typescript for submission to an editor and for press. The second half, headed " Faults in the Use of Words ; Some Examples ", warns intending authors against such common grammatical pitfalls as the unattached participle, the use of the word " following " as though it were synonymous with " after ", the misuse of Latin words and phrases (*e.g., per capita* for *per caput*) and the all too frequent description of a " patient " as a " case " (leading to such absurdities as " the case was admitted complaining of . . .").

In his third article, dealing with matters of presentation and style, Dr. Wilcocks quotes a number of relevant axioms by famous authors, and makes an interesting attempt to analyse the qualities of good prose. He stresses the desirability of an author's taking trouble with his writing, and concludes that " the best medical writing arises from a profound study of an important subject by a writer. . . who takes the care of an artist in seeking perfection in presentation . . .". " Good work can be spoiled by bad presentation " ; on the other hand, " good presentation cannot make up for poor material ".

[It is to be hoped that these three very valuable articles will be reprinted together in pamphlet form, for they would provide a work of reference which many a young writer, and many an older one too, would be glad to have upon his desk. If all scientific authors followed the principles here so gracefully defined by Dr. Wilcocks, the task of many an editor would be immeasurably eased.] *F. H. K. Green*

REPORTS AND SURVEYS

EAST AFRICA HIGH COMMISSION. **East African Virus Research Institute, Entebbe. Report No. 8, 1957–58** [HADDOW, A. J., Director]. 47 pp. 1958. Nairobi: Govt. Printer. [Sh. 5.]

The Institute became 21 years of age in 1957, and this Report opens with a modest reference to some of the achievements which have so amply justified the decision of the Rockefeller Foundation, supported by the Governments of the East African territories, to set up a centre for yellow fever research at Entebbe. During the first 14 years the wide distribution of the virus in East Africa was established, the forest cycle in monkeys and *Aëdes africanus* elucidated, and the role of *Aëdes simpsoni* in transmitting the infection to man worked out. Zoological and entomological studies were undertaken on a large scale, yielding information of great value concerning mosquito vectors and known and potential mammalian hosts. Several previously unknown viruses were isolated during this work ; some of these have been found active in areas far from East Africa. In 1950, when the Institute was taken over by the East Africa High Commission and re-named the Virus Research Institute, the field of research was broadened to include the isolation and study of viruses from man, animals and mosquitoes, special attention being paid to the arthropod-borne virus zoonoses. The discovery of Chikungunya virus in Tanganyika

(and more recently in Uganda), and isolations of an apparently aberrant strain of Rift Valley fever virus (the Lunyo strain) from mosquitoes, rabies virus from dogs, Nairobi sheep disease virus from sheep and ticks, and a virus (probably new) from the salivary glands of bats, exemplify some of the activities of the Institute during 1950–57. Research on yellow fever has been continued, the discovery that bush-babies (*Galago* spp.) are concerned with the maintenance of virus activity in dry areas being of great interest; the arthropod vector in these areas has yet to be found.

During 1957–58, a virus which is either Chikungunya or a closely related agent was isolated from an African out-patient. There is evidence that the Chikungunya virus is pan-tropical in distribution, and a survey of 186 sera from human adults resident in the Entebbe area showed that 10·7% contained neutralizing antibodies for this virus. In this group of sera, the incidence of neutralizing antibodies for Rift Valley fever, yellow fever and Nairobi sheep disease viruses was 4·3, 6·4 and 23·1% respectively. Nairobi sheep disease virus was isolated from 2 duikers (*Cephalophus caerulus*) which suddenly sickened and died while in captivity at Entebbe.

Other work which is briefly described in this Report includes the finding that the Brazza monkey (*Cercopithecus neglectus*) responds to inoculation of yellow fever virus in much the same way as other African monkeys and is presumably able to take part in maintaining a natural cycle of yellow fever transmission in forests; a study of Semliki Forest virus infection in the mouse, in which initial multiplication appears to occur near the site of inoculation and in the neighbouring lymph glands; studies of birds which may be involved in local cycles of virus transmission; field investigations of host preferences and the biting cycle of *Aëdes aegypti*; observations on the hormonic control of ovulation in *Aëdes aegypti*; and the development of improved methods of performing the complement-fixation test with small volumes of reagents.

[HADDOW's historical summary deals briefly with the rigorous studies which have earned for the Institute such a notable reputation as a centre of research on arthropod-borne viruses. The programme initiated by MAHAFFY in 1936 has developed along lines which should continue to provide important additions to knowledge in this field. For a review of the 1956–57 Report, see this *Bulletin*, 1958, v. 55, 837.] *R. S. F. Hennessey*

MILLER, H. **The Role of Surveys in planning Agricultural Development in Jamaica.** *West Indian Med. J.* 1958, Sept., v. 7, No. 3, 222–7.

The under-developed countries which contain 60% of the steadily increasing world population, but produce only some 30% of the world agricultural production, are demanding higher standards of nutrition and living. The dangers of erosion and of depletion of natural resources are becoming better known, as well as the help of modern science in obtaining increased productivity. This paper deals with the problem in Jamaica and describes how it is being attacked.

Erosion is a major problem there. Only seven-eighths of an acre per head is suitable for crops or pasture and two-thirds of this is mountainous and subject to erosion. Agriculture employs 34% of the population, provides nearly 70% of revenue from exports and is responsible for nearly 19% of the gross national output. The factors affecting planning for agricultural development are

described. In 1951 a pilot scheme was started, aimed at halting erosion and developing sound farming in an area of 4,500 acres. A farm-by-farm census yielded information about land titles, sources of farm credit, indebtedness, size of farm families, amount of family employment off the farm, and marketing organizations and costs. A soil surveyor also made a survey and Social Welfare officers studied community problems and facilities. The problem thus assessed, an appropriate programme of rehabilitation and development was constructed and staff were trained in the techniques of education and development.

In 1954 the scheme was extended and a similar authority was set up for a second area, and in 1955 a Farm Development Scheme was applied to 13 selected areas and eventually will be throughout all Jamaica. The soil survey on an island basis is nearly complete. The Scheme now covers over 11% of the total farm land and by 1960 probably 20% will be involved. Technical guidance and assistance, together with loans and grants, are provided for planning and developing farms according to their capabilities, and human and other resources are exploited for improving social and economic welfare. Evaluation of these schemes is being planned with a view to increasing progress and finding defects.

This paper should be read by those concerned with the welfare of agricultural communities in under-developed areas. *T. H. Davey*

BARTH, R. Observações biológicas e meteorológicas feitas na Ilha de Trindade. [**Biological and Meteorological Observations in Trinidad Island, Brazil**] *Mem. Inst. Oswaldo Cruz.* 1958, June, v. 56, No. 1, 261–79, 21 figs. (12 on 5 pls.) German summary.

A study of flora, fauna, climate and ecology.

BOOK REVIEW

MOZLEY, Alan [D.Sc., Ph.D., F.R.S.E.]. **Ecological Processes.** pp. xi + 68. 1959. London: H. K. Lewis & Co. Ltd., P.O. Box 66, 136, Gower Street, W.C.1. [9s.]

Dr. Mozley has written a series of short monographs on snails as vectors of disease, particularly schistosomiasis and to a lesser degree fascioliasis [this *Bulletin,* 1955, v. 52, 417; 1956, v. 53, 260]. The later books of the series have been concerned with molluscan ecology, and the present brief volume restates and expands the arguments in the previous books. He makes a plea for the study of ecology so that forecasting may be made more accurate and control simplified. The thesis around which the book is written is that every animal community is in a continual state of change, and he discusses the changes which may occur and the factors influencing them. There are 7 chapters followed by 2 pages of general discussion, after which the conclusion is drawn that ecological processes should be studied, their course plotted and that they should be modified as necessary. Two brief appendices and the index conclude the volume.

The chapters deal with a variety of subjects. The first discusses the effect of a changing environment on an organism, and it is pointed out that though environmental factors are investigated separately they are in fact interdependent. The conclusion is reached that the organism can adapt to a variety of environmental changes by means of physiological mechanisms. Ecological succession is discussed and the natural selection which environmental factors may effect. This is followed by a chapter on the practical importance of ecological succession, in which it is pointed out that man tries to stabilize succession at a point favourable to himself, and that succession can be encouraged so that a harmless species will replace a dangerous one. In the chapter on " Populations " the importance of the density of disease vectors is argued, a concept which seems to be new in snail-borne though not in arthropod-borne disease. The author again recommends " naturalistic " control measures, aided by selective chemical poisons acting primarily on the undesirable species. The various conditions in which snail populations are found in the field are listed and explained. The last chapter, on " Movement ", deals with the scale and results of migration of organisms, and again the author condemns the use of crude destructive measures unless the underlying situation is altered as well.

[The general impression left on reading this book is that an attempt to control schistosomiasis vectors is dangerous unless the complex ecological conditions of the organisms have been studied. In reality action usually has to be taken before the desired knowledge has been acquired. The book is not a handbook of practical information, it is a short treatise on several principles of ecology and since it uses the technical vocabulary of that science it will prove difficult reading for the ordinary medical officer concerned with schistosomiasis control. It is essentially an anthology of quotations from a large variety of works on animal ecology, which are linked together by the author's observations. The book would have been more generally valuable if he had reduced the statements of principles to language which the ordinary doctor could understand and had thus interpreted the principles of ecology in relation to schistosomiasis.] *T. H. Davey*

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